SEPA
Scottish Environment Protection Agency

SHAPING THE FUTURE OF WASTE MANAGEMENT IN AYRSHIRE, DUMFRIES AND GALLOWAY

DEVELOPMENT OF WASTE MANAGEMENT OPTIONS FOR MUNICIPAL SOLID WASTE AND DRAFT AREA WASTE PLAN

The following organisations participated in the development and assessment of the Strategic Waste Management Baseline Assessment (SWMBA) and subsequent waste management options outlined in this document.

North Ayrshire Council

Dumfries & Galloway Council

East Ayrshire Council

Scottish Enterprise Ayrshire

South Ayrshire Council

Scottish Enterprise Dumfries and Galloway

Foreword

Waste management in Scotland is facing a period of radical change. Driven by European legislation and public expectation as well as pressing environmental problems, we must find ways of reducing our dependence on landfill and move towards a more sustainable method of managing waste. We must reduce the amount of waste we produce, reduce the hazardous content of waste and find solutions that do not compromise the future - in line with sustainable development.

To tackle these issues in Ayrshire, Dumfries and Galloway, a Waste Strategy Area Group (WSAG) was formed. This group is a partnership between SEPA and the four unitary local authorities:

- North Ayrshire Council
- East Ayrshire Council
- South Ayrshire Council
- Dumfries and Galloway Council

All four unitary authorities are structure planning authorities. The role of Scottish Enterprise was limited by the focus on local authority responsibilities for municipal solid waste (MSW). It is expected that their role will expand as we move on to consider commercial and industrial wastes.

The group is one of eleven waste strategy areas in Scotland. They form a key part of the National Waste Strategy and are charged with proposing long-term effective solutions for local waste management issues. This consultation paper is an important part of the process and provides:

- an introduction to the main issues,
- an outline of the group's work to date,
- a first draft Area Waste Plan for assessment.

Its intention is to inform and stimulate genuine debate about the findings of the Strategic Waste Management Baseline Assessment (SWMBA) and engage participation from stakeholders in the appraisal of options and the proposed Best Practicable Environmental Option (BPEO), the option that will deliver the most sustainable means of managing waste in the area.

The ultimate aim of the group is to produce an Area Waste Plan that outlines how waste will be managed and has genuine support and buy-in from everyone living and working in the area. This plan will provide a broad and flexible development framework that gives all key players the opportunity to develop solutions to waste management problems. A draft plan is put forward here for consideration. A full plan will be developed after the results of this consultation are known and the findings are used to shape the final plan. Your participation is, therefore, very important.

Alastair Dewart

Chair, Ayrshire, Dumfries and Galloway Waste Strategy Area Group

SEPA Chairman Foreword

I welcome the publication of this draft Area Waste Plan for the Ayrshire, Dumfries and Galloway Waste Strategy Area and look forward to receiving constructive feedback from this public consultation programme.

This draft plan is one of eleven being prepared across Scotland and represents the output from months of hard work by each of the members of the Ayrshire, Dumfries and Galloway Waste Strategy Area Group. I commend all of the participants for their contribution to this important process.

Publication of the final Area Waste Plan is expected by Autumn 2002 and will take account of the feedback received during the consultation programme.

Scotland's statutory obligations under the EU's Waste Framework Directive will be discharged through the development and successful implementation of Area Waste Plans for each of Scotland's eleven Waste Strategy Areas. These plans will also deliver the vision of more sustainable waste management in Scotland - as set out by SEPA in the National Waste Strategy: Scotland, published in 1999.

There is no doubt that waste is everyone's responsibility. Our behaviour must undergo rapid and fundamental change over the next five to ten years if we are to meet the challenges of Scotland's National Waste Strategy and the requirements of EU and UK policy and legislation. Waste must increasingly be managed as part of an integrated process that shifts from the current culture of waste disposal, to one of resource and materials management that will make a significant contribution towards more sustainable development and a modern infrastructure and economy in Scotland.

Central to the delivery of this fundamental shift in waste management practice is the forging of robust long-term working partnerships between the key members of each local Waste Strategy Area Group. These will ensure the ongoing, meaningful contribution by all stakeholders into the development and implementation of the local Area Waste Plans in Scotland. These essential contributions, in conjunction with a range of ongoing development, research and promotional activities, will ensure the successful delivery of the vision as set out in the National Waste Strategy: Scotland.

Ken Collins

SEPA Chairman

Contents

This document is split into five parts. The first four show the steps used in building towards a draft Area Waste Plan. Section 5 is the actual draft AWP. As a consequence there are elements of repetition of the earlier stages in Section 5.

1 How the Process is Built and Operates

This section sets out SEPA's process for developing the Area Waste Plan and in particular the tools used, so that people can have a clear understanding of what is involved. Information on the progress of the work being carried out by the group is also given.

1.1 Developing the Plan

The Area Waste Plan

The main purpose of the Area Waste Plan is to provide a local framework, which will aid the strategic planning of an integrated network of facilities for the flexible management of waste. It should also ensure that the aims and objectives of the National Waste Strategy are promoted locally and the relevant legislative targets met. The main steps to building the plan are outlined below.

Stages in Developing the Area Waste Plan

Step 1

Strategic Waste Management Baseline Assessment (SWMBA) Complete

Involves the extensive gathering and analysis of data on the different types of wastes produced, along with forecasts on growth and impact of targets. The completed SWMBA is available from the contact points listed at the end of this document.

Step 2

Option development and appraisal Complete

Involves the development and analysis of the issues for consultation. This outlines the initial set of waste management options for public consultation and comment as a key step in shortlisting the Best Practicable Environmental Option (BPEO) for Ayrshire, Dumfries and Galloway. The review of feedback is critical to the subsequent decisions on key waste streams.

Step 3

Identification of Best Practicable Environmental Option (BPEO) Ready

This follows the initial review and analysis of the options to shortlist the preferred options. Thereafter detailed analysis of the shortlisted options is used to identify the BPEO. This is then used to inform the drafting of the Area Waste Plan.

Step 4

Developing the Area Waste Plan Draft ready

The Draft Area Waste Plan is produced using BPEO and is submitted to full consultation. Review of the feedback is incorporated before the plan is finalised and set for adoption.

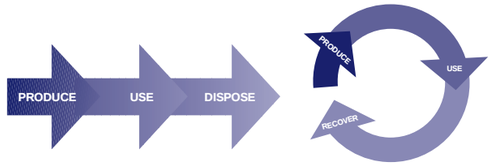
Underlying principles

There are a number of well-accepted principles for sustainable waste management that the Area Waste Plan must consider. In addition, there are several new concepts that SEPA's National Waste Strategy: Scotland has developed. Each of these is considered in turn.

Sustainable Development

This is the key underlying principle. Sustainable development has been defined as development that meets the needs of the current generation whilst allowing future generations to meet their needs. It covers environmental protection and the need for social and economic development. The National Waste Strategy sets out to change our use of resources by challenging us to view waste as a resource to be managed more effectively rather than sticking to our simple use and dispose culture as shown in figure 1.

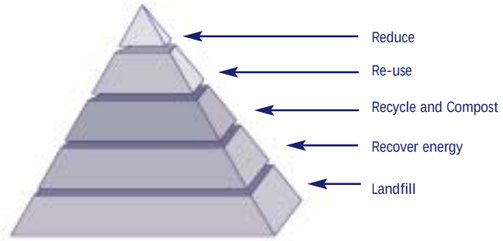
Figure 1 Resource Use Model



Waste Hierarchy

The waste hierarchy ranks the desirability of different waste management options in order of preference. It is meant as a guide rather than a rigid rule book, as there will be occasions when a lower option is preferable to a higher option. For example, the environmental impact of collecting recyclable material and transporting it a long distance to a reprocessing facility may be greater than simply landfilling it locally.

Figure 2 The Waste Hierarchy



Waste Minimisation

Waste minimisation is the reduction of waste that is produced and it is likely to take some time to work up a coherent action plan. There are two clear target audiences:

- Businesses - many studies have already shown the practicality of action in individual businesses.
- Householders - it is important that householders understand the need for waste minimisation and also how to achieve it. All four councils encourage householders to minimise and recycle waste through various campaigns and promotions such as home composting projects, recycling initiatives, waste awareness raising and publicity.

Proximity Principle

This promotes the management of wastes as close to the site of their production as possible, to reduce the impact of transporting waste and to make waste producers more. Again, this is meant as a guide rather than a rigid rule as economics of scale have to be taken into account. However, the proximity principle reminds us that we are all producers of waste and should take responsibility for it ourselves.

Best Practicable Environmental Option (BPEO)

The Royal Commission defined the BPEO as:

> "... the option that provides the most benefits or least damage to the environment as a whole, at acceptable cost, in the long-term as well as in the short term"

This concept is fully in line with the principles of sustainable development and is the main concept behind the process SEPA has encouraged for developing the Area Waste Plans.

Integrated Waste Management

Historically, decisions on waste disposal in Scotland were often made separately from decisions on collections, recycling and waste minimisation. Integrated waste management simply seeks to bring all these together, to produce a system that minimises the quantity and hazard of wastes, looks for efficiencies and maximises the value waste as a resource, such as through recycling.

1.2 Best Practicable Environmental Option (BPEO)

Fora representing all stakeholder interest were recruited to assess the strategic waste management options identified by the WSAG in parallel with the public consultation process. The findings will be used to support the subsequent determination of the BPEO.

Determining BPEO

BPEO is a key concept for the Area Waste Plan and the table below identifies the key steps in determining the BPEO for a waste stream (waste from a particular source or origin). The waste streams considered in the Area Waste Plan are as follows:

- Household and commercial waste (municipal solid waste – MSW* - plus commercial waste privately collected);
- Industrial waste (including specialist wastes such as clinical waste, batteries, electrical goods and electrical wastes);
- Construction and demolition waste.

The BPEO Process

Step 1 - Establish the Baseline	
• characteristics of the area, e.g. population, industry, geography and geology; the amount and types of waste produced in the area; • waste management facilities and collections; • the effect of legislation; • activities of the voluntary, community and not-for-profit sector.	Completed by a group comprising local authority officers and SEPA.
Step 2 - Options Generation and Profiling	
• determine what management options exist for waste; • using the information collected in Step 1, determine the appropriate options for the area; • ensure options meet the aim of an integrated waste management.	As Step 1.
Step 3 - Options Assessment	
• consider the environmental impacts of each option; • consider the financial and economic implications of each option; • determine if relevant targets (e.g. the Landfill Directive diversion targets) will be met; • comparison of options with the current situation.	Completed, except for the stakeholders consultation, which is being undertaken as part of the full public consultation.
• consulting with all stakeholders i.e. the local authority, the local enterprise company, non-governmental organisations, waste producers, the waste management industry and the community and voluntary sector.	As above.
Step 4 - BPEO selection	
Having rated each of the options against the agreed criteria, and using feedback from stakeholders, the option that gives the best economic, environmental and social solution is selected.	The group have identified a proposed BPEO. This is now being consulted on.

*MSW, Municipal solid waste, includes household waste and any other wastes collected by a waste collection authority, or its agents, such as municipal parks and garden waste, beach cleansing waste, commercial or industrial waste, and waste resulting from fly tipping.

1.3 Tools

SEPA produced guidance on the process by which the options are generated, and the criteria by which they should be judged. These criteria were developed at a national level using stakeholder workshops (see National Decision-making Criteria below).

WISARD

A life-cycle analysis tool called WISARD was used to judge the environmental implications of options. This software was developed by SEPA in association with the Environment Agency for England and Wales. It was used to calculate the environmental impacts of a waste management option across its entire life cycle, including production, use and disposal, and across land, air and water.

It should be noted that WISARD does not allow the modelling of all commercial waste at present. However, as a significant percentage of commercial waste is similar in composition to household waste (paper, plastics etc.), WISARD can be used to model the environmental impacts arising from a proportion of commercial waste. It is, therefore, assumed that the BPEO for household waste will be similar to the BPEO for commercial waste.

The results of the WISARD analysis were then compared by looking at the effects on the following:

- Global warming,
- Depletion of non-renewable resources,
- Ozone depletion,
- Air acidification,
- Eutrophication,
- Human toxicity,
- Aquatic toxicity,
- Terrestrial toxicity.

The above are based as closely as possible on the priorities set out in SEPA's Environmental Strategy. The first three are considered to be national priorities and should be taken into account by all WSAGs. The others are local issues and to be taken into account where decided by individual groups. It should be noted that life cycle assessment is not an ideal tool for assessing toxicity and these should be used as general indicators only.

National Decision-making Criteria used in Assessing Options for BPEO

Environmental

Air, Land and Aquatic Environment
How much pollution would be released to air, soil and water under each option?

Cultural Heritage
What is the effect of the option on the built environment and archaeological sites?

Global Climate Change
What will be the net release of gases, such as carbon dioxide and methane, which contribute to global climate change under each option?

Local Amenity
What positive or negative impacts will each option have on local environmental issues such as odour, traffic, litter and noise?

Natural Heritage
What is the effect of the option on the quality, quantity and diversity of landscape and ecological resources?

Non-Renewable Resource Use
How many finite resources such as fossil fuels and mineral reserves will each option consume and will the option improve resource use in the economy?

Accidental Risks
What are the risks of accidents to people (workers and public) from this option, such as on the roads, accidental releases of pollutants etc.?

Economic

Cost
What are the total costs of waste management under each option?

Financeability, Affordability
Can we afford the option? How will it be funded, for example will private industry provide the waste facilities and services envisaged or will the option require public spending? Will it involve up-front capital investment or longer-term operating costs?

Impact on Local Economy
What positive or negative effects will each option have on the local economy due to waste management related activities?

Social

Employment
What effect will the option have on the type, numbers, quality and distribution of jobs in waste management including recycling? What will be the effect on local employment levels?

Making Producers Responsible
Does the option encourage waste producers to take responsibility for their own waste?

Public Acceptability
Is the option likely to meet with the public's approval?

Skills Base
What effect will the option have on the provision and quality of training and on the quality and diversity of skills in the workforce?

Social Implications (poverty, exclusion and access)
What effects will the option have on the welfare of local people, for example, access to goods and services such as refurbished household equipment?

Practicality

Flexibility
Does the option allow for possible new demands on, or opportunities for, waste management arrangements e.g. the need to collect additional material for recycling due to population growth, the emergence of new waste management technologies?

Existing Facilities and Expertise
Does the option make effective use of existing waste management sites, facilities and resources?

Practical Deliverability
Is there a risk that the things needed to make the option work will not actually happen?

Technical Feasibility
What level of risk is associated with the technologies involved e.g. because they are untried?

Fit with Policy

Compliance with Other Policies
Does the option support or conflict with other areas of EU, national or local policy such as in planning, energy and economic development?

Development Planning

There is a clear need for the Area Waste Plan to offer focused, concise and useful advice to the development planning process. Statutory Planning Officers sit on the WSAG.

If the Area Waste Plan is to make BPEO decisions, then it is logical that those decisions are carried through to the development planning process. This would mean that the Area Waste Plan would be a material consideration when determining whether or not to grant any planning application for future waste management facilities. Consistency between Development Plans and the Area Waste Plan should provide clear advice to the waste industry on the framework for investment decisions.

Environmental Impacts

It is proposed to compare the environmental impacts of the options identified for key environmental criteria (from the national decision criteria). This will be represented in simplified form, with more detailed results taken from WISARD.

One step in the process will be to run the models in WISARD (to gain quantitative outputs to tabulate the simplified results) and then compare the environmental impacts against the baseline to see which option offers the greatest environmental benefit.

Other Issues

There are a number of other important issues that should be considered:

- Changing attitudes to sustainable waste management by education, awareness raising and publicity.
- Identifying whether aspirational targets can play a role in developing the Area Waste Plan.
- Examining the scope for local market development for recycling. This means finding new uses for recyclable materials. For example, glass bottles can be processed into a gravel substitute and used in concrete slabs, road building etc.
- Sustainable waste management on islands. It is recognised that islands have particular problems with waste management in relation to transport costs, access to facilities and recycling opportunities.

1.4 Analysis of the Process and Tools Used

Your views on how effective the tools are in developing an Area Waste Plan are needed. This helps to validate the analysis carried out by the group, as well as highlight areas that will need revisited or further developed. This process helps shape the final outcome of the plan.

2 The Issues and Broad Options Considered

The purpose of this section is to set out the issues and problems encountered by the group when they were looking at waste across the three Ayrshire Councils and Dumfries and Galloway Council. Given the problems encountered they have tried to develop broad-based generic solutions. These followed the basic premise that there are only a certain number of things you can do with waste and from there tried to identify the best practical way forward. It is particularly important to note that the options set out by the group are general and are capable of being implemented within the different constraints under which the four different authorities operate.

2.1 Challenges Facing the Area

Background to the Area

There are a number of issues driving the environmental agenda across Ayrshire, Dumfries and Galloway. Each of these is significant, but overall they make a pressing case for change. There is a clear need to move towards sustainable waste management, in line with the principle of sustainable development (see Section 1.1) The approach to waste management in the area needs to be developed to divert more waste from landfill. Waste facilities in the area aimed at more than disposal are limited. The existing local authority landfill sites may require upgrading to meet with legislative requirements and there are question marks surrounding the future capacity in some of the local authorities.

Being predominately rural, there are disposal problems for some types of wastes. For householders, however, there are networks of civic amenity sites and deposit sites provided by the local authorities for the collection of glass, paper and other recyclable materials. The commercial and industrial sectors do not have the same level of access to this type of facility. The geography of the area imposes barriers to the easy integration of the four local authorities' waste infrastructures.

Legislation and Targets

The Landfill Directive seeks to impose minimum environmental standards for landfills across Europe and will ban the landfilling of many substances that are currently disposed of in this way, such as tyres. The Directive also requires progressive reduction in the landfilling of biodegradable municipal solid wastes (BMW) such as food, paper, wood and other wastes which decompose and produce pollutants when landfilled.

One impact of the Directive targets, as shown in Table 1, is the need to divert biodegradable waste away from landfill. The table highlights the scale of the challenge. Firstly there is a high degree of uncertainty in the forward prediction and planning for waste (hence the minimum - maximum range approach adopted). Secondly, small changes in growth can lead to significant increases in the diversion required to meet the Directive. This emphasises the crucial importance of reducing the amount of waste being produced and having flexible options that can cope with uncertainty.

The Landfill Directive will be transposed into Scots Law in the near future.

Table 1 Landfill Diversion Targets
From a baseline set at 1995 (when approximately 180,000 tonnes of BMW were landfilled) the amount of BMW that can be landfilled will be progressively reduced. It is estimated that this translates to the following target range for the area.

Diversion required by	Minimum (assumes 0% growth)	Maximum (assumes 2% growth)
2010	41,549	110,854
2013	87,082	172,688
2020	112,731	240,101

Data from SWMBA appendixes 2 & 3

Rising Costs

The costs of waste management have been rising steadily over the last decade. The indications are that disposal costs alone are likely to treble within the next decade. The introduction of the landfill tax at £7 per tonne for active waste (which decomposes when landfilled) in 1996 sought to make waste producers pay for the environmental cost of landfilling. The tax is, at the time of printing, £13 per tonne and is due to rise to £15 per tonne by 2004. The landfill tax currently costs the area more than £3 million every year. At £15 per tonne, by 2004 this figure could rise to as much as £5.5 million. There is increasing pressure to step up the rate of landfill tax increase even more.

A recent report by the Scottish Executive pointed to at least a doubling of current local authority collection and disposal costs just to meet the requirements of the Landfill Directive (see Table 2).

Table 2 Predicted Costs (Gross) for Scottish Local Authorities to Meet Landfill Directive Diversion Targets

Date	2000	2010	2013	2020
Baseline Costs (£M)	196	239	255	296
Directive Costs (£M)	196	277	317	397
Incremental Costs of Directive (£M)	0	38	62	101

Source: Local Authority Waste Management Costs Study, Scottish Executive, 2000.

Economic Pressures

As well as the negative environmental impacts, there are clearly economic opportunities arising from waste. The real cost of waste is far higher than the cost of waste disposal, as factors such as wasted raw material and labour, energy and management costs are not accounted for. It has been estimated that for every tonne of a product produced (this could be any product from TVs to tins of paint) nine tonnes of raw materials are lost as waste. There is now clear evidence that waste minimisation schemes significantly reduce this wastage, delivering competitive advantages to companies which adopt such schemes.

2.2 The Existing Situation

The WSAG has produced a baseline assessment (SWMBA). This is based on data for the 1998 calendar year and was used to establish the existing position for waste management in the area.

The key findings of the assessment were:

- Slightly over 1 million tonnes of waste were produced in the area of which about 85% is disposed of in the area, giving a relatively self-contained waste management system with few imports or exports.
- Around 330,000 tonnes of Municipal Solid Waste (MSW) (i.e. household waste plus commercial waste collected on or on behalf of the local authorities) were produced, of which 95% was landfilled.
- Around 147,000 tonnes of commercial waste (not collected by or on behalf of the local authority as MSW), were produced most of which was landfilled.
- Around 138,000 tonnes of industrial waste were produced, most of which was landfilled.
- Around 400,000 tonnes of construction and demolition waste were produced, most of which was landfilled or disposed of through exempt routes.
- An estimated 4.9% of household waste was recycled (compared to a Scottish average of 5.5%). Figures varied between 3 and 10% across the four local authorities.
- To meet the Landfill Directive targets (outlined in Table 1) and to upgrade their existing landfill sites, Dumfries and Galloway Council are seeking to enter into a Public, Private Partnership with a private waste contractor.

- There is a shortage of good quality data on commercial and industrial waste arisings.
- There is a shortage of information on the growth rates for all types of waste and a lack of understanding of the underlying causes and the best methods to model them.
- There is a shortage of information on waste disposed of under exemptions from waste management licensing. This includes a large percentage of construction and demolition waste.
- The quality of the data forced the group to focus on MSW for the first stage in developing a comprehensive Area Waste Plan.
- An active voluntary and community sector which collects waste such as glass, paper, etc for recycling and re-uses or reprocesses material for local use, such as shredded paper for animal bedding, community composting initiatives etc.

Note: Data projections only give an indication of what we think may happen.

2.3 The Strategic Waste Management Options

The lack of good quality data on other waste streams forced the group to focus initially on municipal solid Waste (MSW). Six broad strategic options for the future management of MSW in the area were proposed by the WSAG. Impacts of these options will have to be considered under the minimum and maximum assumptions for growth (see Figures 3 to 8) until monitoring and the provision of better data allows these assumptions to be improved. The group's proposals for tackling the other waste streams are outlined after the options.

Waste Management Options

The options are outlined and presented as flow diagrams. It should be noted that all of these models contain the following common elements in addition to those specified in the diagrams:

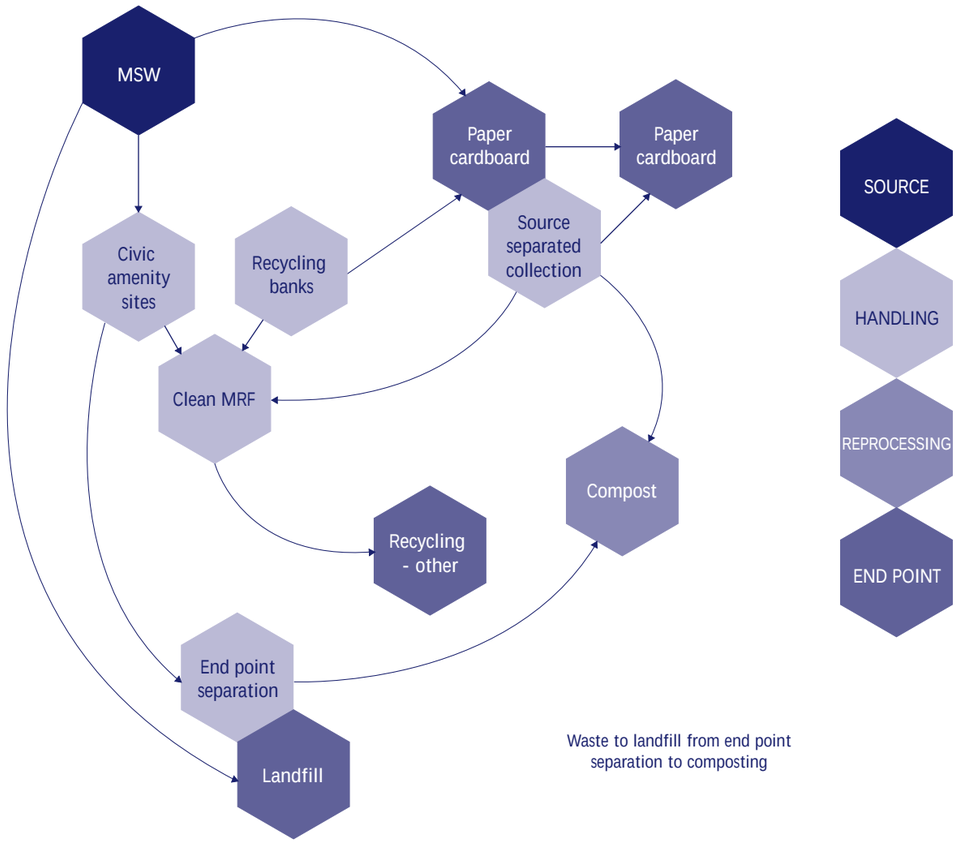
- an education and awareness programme;
- waste minimisation programmes;
- home composting;
- public, private, voluntary and community sector partnerships;
- deposit sites and kerbside collection for specific materials;
- civic amenity sites;
- hazardous household waste collection;
- upgrading of existing landfill sites;
- evaluation of costs based on capital costs and indicative operating costs, allowing broad comparison of the options (note: over allowance for income, e.g. from selling recyclate, energy etc was made at this stage);
- evaluation of ability to meet targets based on a working model which ran the maximum and minimum returns from a range of participation levels. The model was run using the SWMBA growth rates.

Option A - Extend existing practices

Would seek basic compliance with the Landfill Directive through expanding current methods and programmes, such as more separated collections for paper and card. More recycling collections plus more civic amenity provision. Greater encouragement of recycling and composting. Greater encouragement of home composting and community programmes.

Figure 3

Option A - Extend existing practices



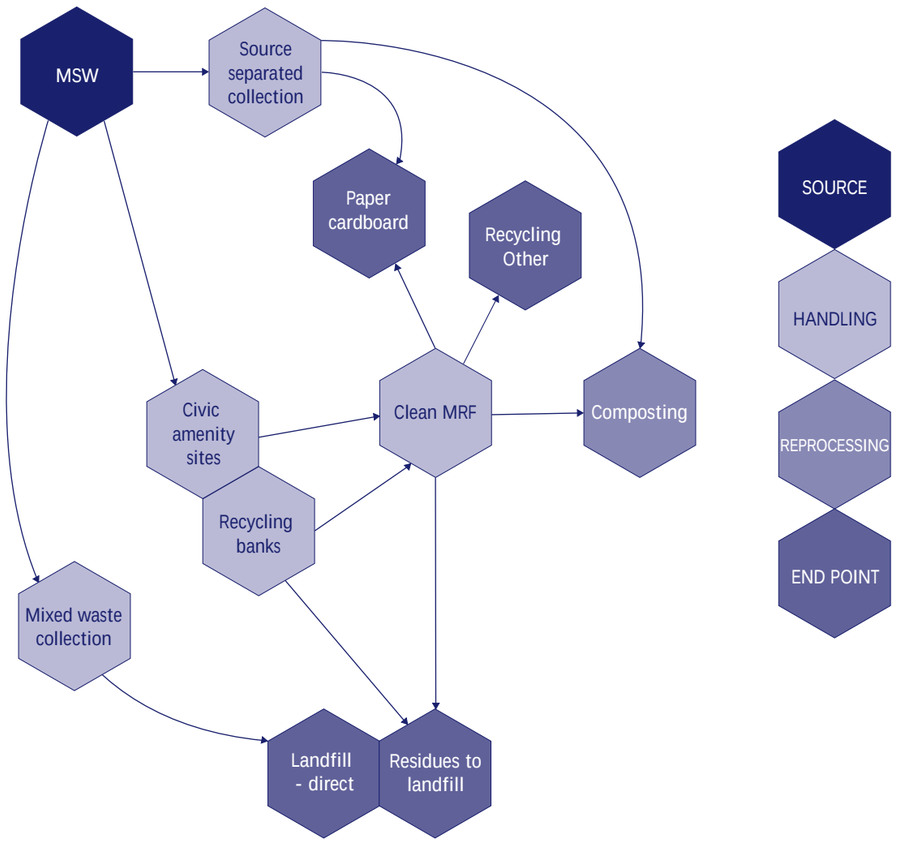
Preliminary investigation indicated that whilst this may be one of the cheapest options, it is heavily dependent on a car owning population to actively bring waste to the facilities. It is dependent on stable markets being developed for the composted waste and the materials recovered for recycling. It requires exceptionally high participation rates and high yields of materials to make it work. It is unlikely to meet the target requirements even at the lowest estimates for waste growth and highest rates for participation and yields.

Option B - Maximise Recycling

All waste would be completely or partially segregated before collection into, for example, dry recyclables and wet waste, to maximise the amount of material that could be recycled. This option is split into a clean materials recovery facility (MRF) (option B1) and dirty MRF (option B2) depending on whether the focus is on recycling or composting. The success of either of these options would depend on additional reprocessing facilities in Scotland for a wide range of materials including paper, glass, plastics and metals. The indications are that these options may be capable of meeting the early targets, but are unlikely to meet the final landfill diversion targets even at the most optimistic prediction levels.

Figure 4

Option B1 - Maximise Recycling with clean MRF

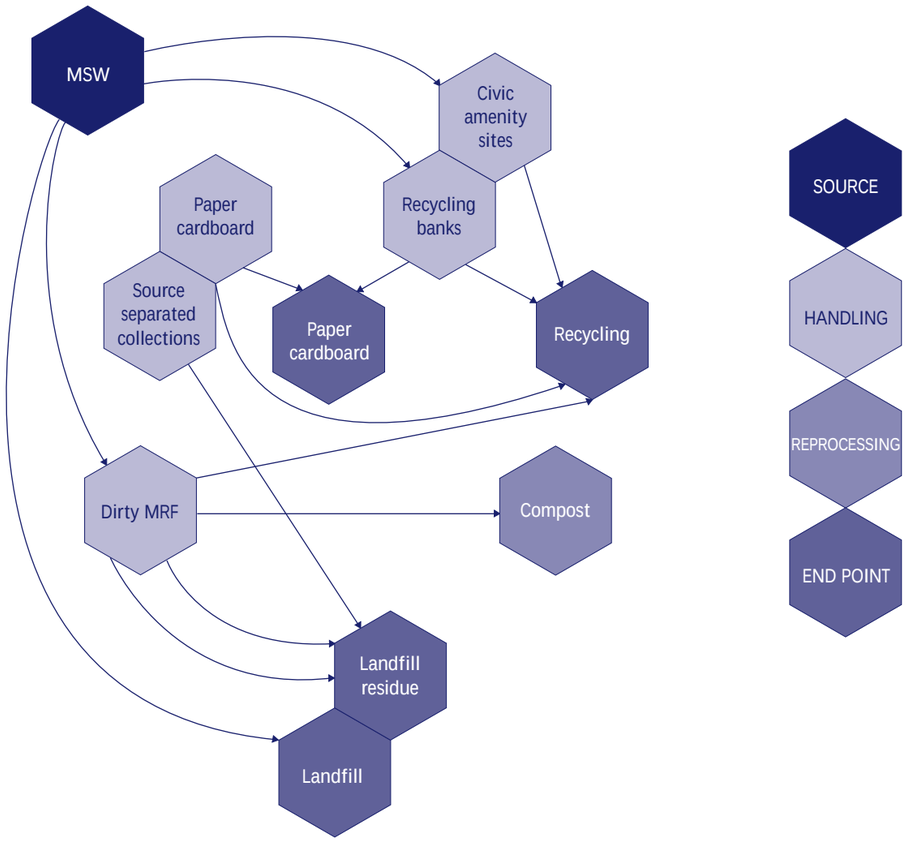


Option B1

This option potentially offers more jobs. The emphasis is shifted from bring facilities to a better-managed means of gaining active public participation as waste will have to be separated by householders before collection. As a consequence it is much more inclusive. It depends on developing the recycling infrastructure in Scotland and stable markets for materials. Analysis of costs assumed a high proportion of composting and collection in alternate weeks. Depending on the systems actually used, the overall costs could rise to match option B2.

Figure 5

Option B2 - Maximise Recycling with Dirty MRF



Option B2 - Maximise Recycling with Dirty MRF

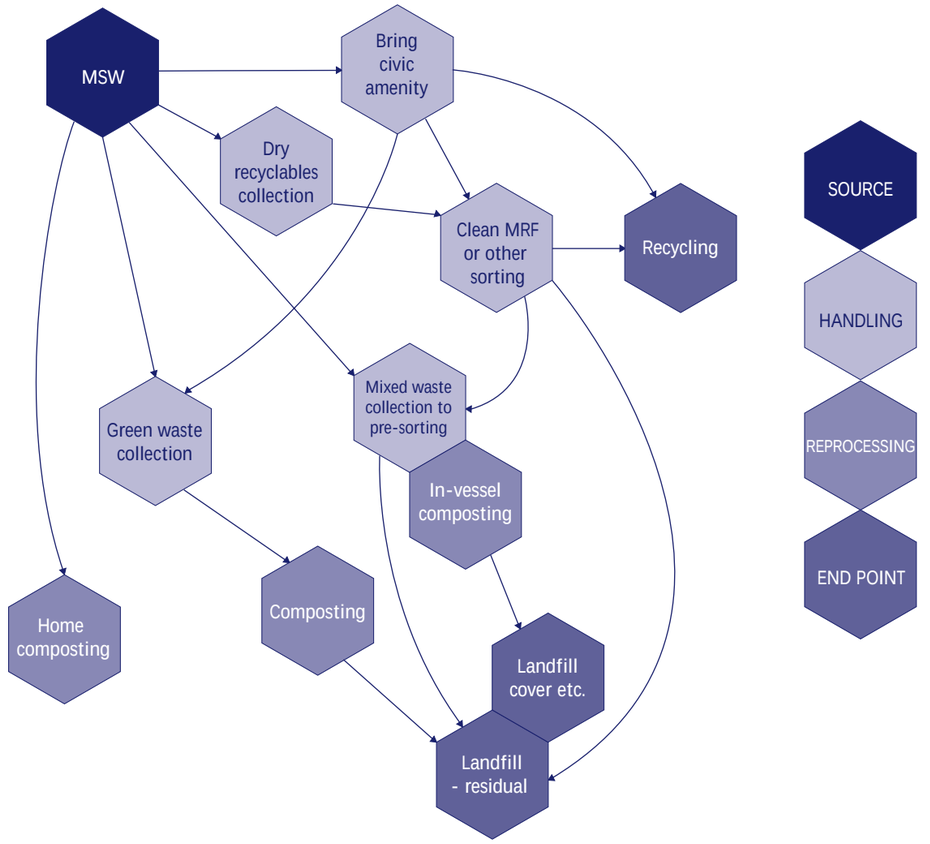
This is the more expensive of the recycling (B1 and B2) options and one of the most expensive overall. Requires little additional input from the public, but depends on labour intensive, expensive dirty materials reclamation technology where the waste is separated at the facility after collection. Will meet the first targets. There is a high risk that the technology will not deliver the yields necessary to meet subsequent targets, irrespective of development of recycling infrastructure and markets.

Option C - Multi-composting

Encourages home composting. Uses separate green collections so that a significant quantity of the biodegradable waste could be composted at centralised points, providing a high quality compost. Proposes in-vessel composting of non separated collected MSW. The resultant poor quality compost material would then be used for restoration work on landfill sites. Small amounts of screened waste and wastes unsuitable for composting, would continue being landfilled in the area.

Figure 6

Option C - Multi-composting



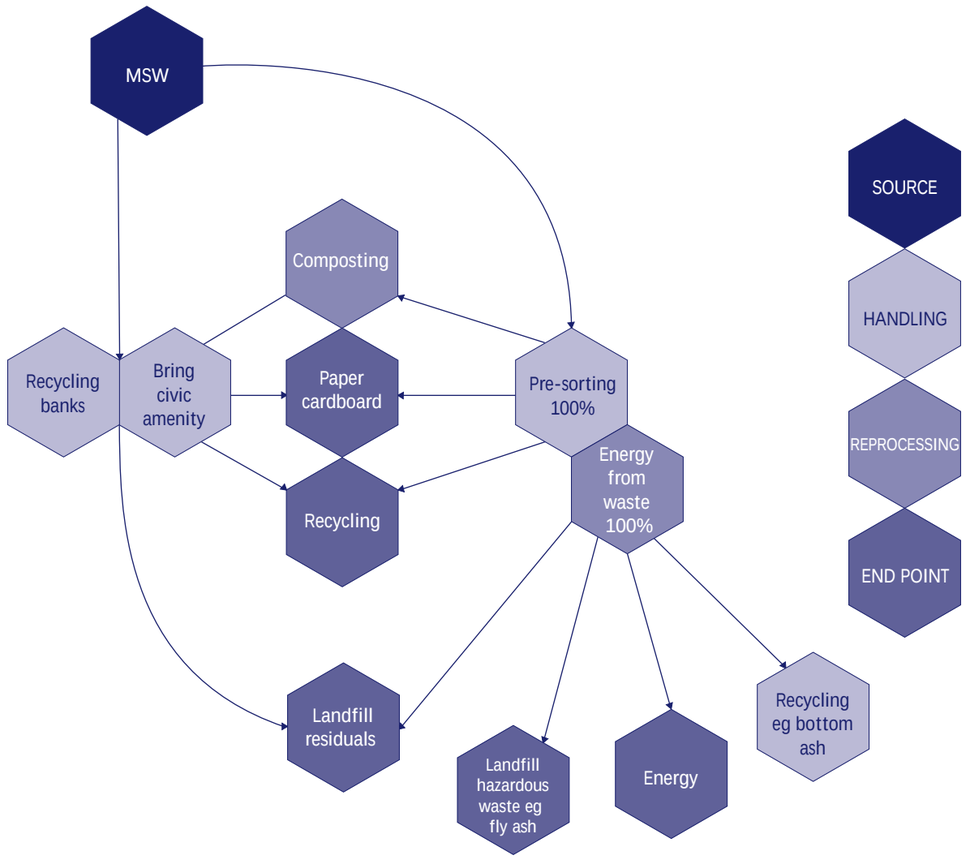
Preliminary analysis reveals that composting on this scale has surprisingly large mechanical and energy usage, with corresponding life cycle and environmental impacts. Questions have been raised about the sustainability of producing a low quality compost merely to landfill it. Success of this option depends on high participation in the segregated green waste collection and development of a market for the compost produced. Offsetting this is the potential for local authorities to develop internal markets for their produce, in other words use it themselves! Changing legislation to combat the risk of spreading infection (post foot and mouth disease) may have a profound effect on the final shape and cost of this option. Option unlikely to meet the final diversion targets.

Option D - Maximise Energy from Waste

Non separated collected MSW would be taken to a sorting facility and the majority of the waste fed through an energy from waste plant. Unsuitable elements would either go to recycling or landfill. Most of the waste ash (bottom ash) from the plant could be recycled into building products such paving slabs, road bottoming etc. The fly ash, classified as hazardous, would have to go to a suitably designated site. Collection of recyclable waste (glass, paper, cans etc) could be expanded through a recyclable collection system and expanded civic amenity sites and through pre sorting wastes to ensure it is suitable for the energy from waste plant.

Figure 7

Option D - Maximise Energy from Waste



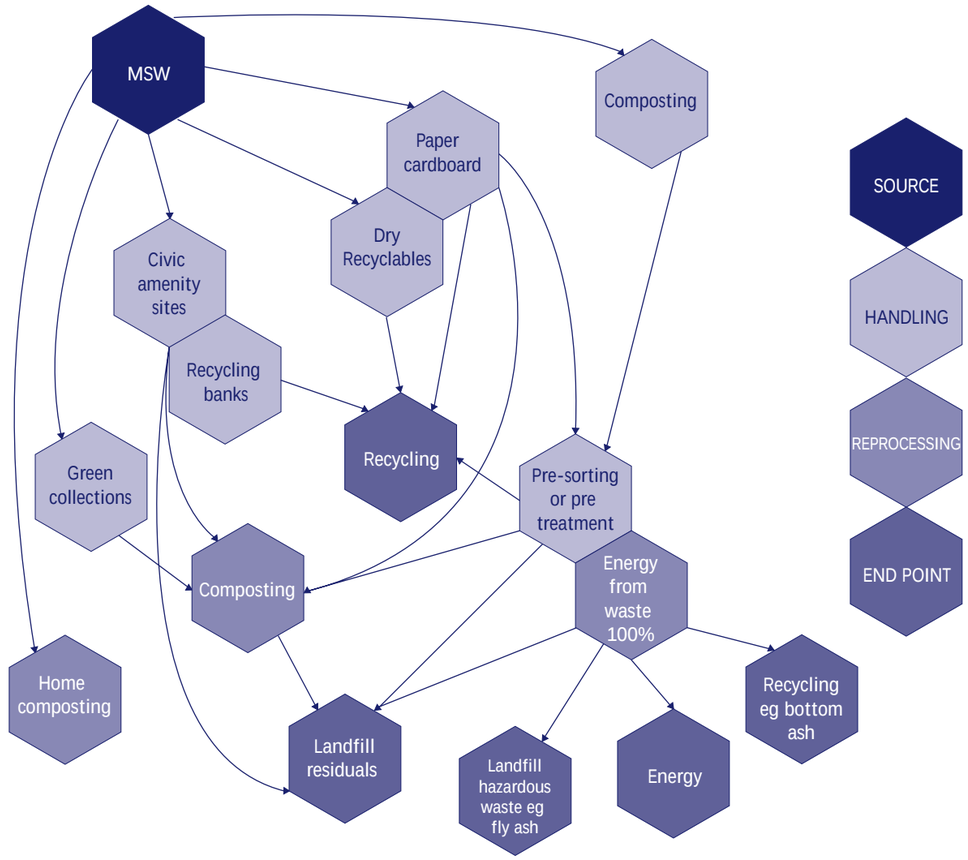
This is the most expensive option. It is, however, one of the few that can guarantee all the diversion targets will be met. It does not, however, fit easily with SEPA policies, being large scale and involving the mass burn of relatively unsorted wastes. The scale of such an operation is not regarded as sustainable, being only one step up the waste hierarchy. Furthermore, the scope for developing recycling and composting is restricted to a role supporting the energy value of the waste being used as a fuel. Recycling etc could only be developed if waste levels continued to grow at rates well in excess of the capacity of any energy from waste plant.

Option E - Maximum flexibility

Recognises that the four local authorities are driven by different pressures, socially, economically and geographically. Assumes that the best results may be achieved by picking and mixing elements of the other options and applying them across the whole area. This approach minimises the risk of depending on any one technology. This further maximises the likelihood of success in meeting all the targets, not just the landfill diversion ones, and minimises the risk from market instability by offering a flexible, responsive approach to change.

Figure 8

Option E - Maximum flexibility



This is the most complex model in terms of the mix of technologies used. Consequently it is the most difficult to cost, however estimates of different mixes of technology appear broadly comparable to the maximised recycling approach (option B). The model does not assume that every element would be deployed in every part of the area. Instead it assumes that the most suitable elements are selected and a mechanism put in place to ensure that processes could be scaled up or down or re-routed to other elements in response to changing markets, improvements in alternative technologies etc.

Note: the additional energy from waste element modelled here does not preclude the use of other technologies, such as anaerobic digestion etc. Such an approach allows each local authority to determine a suitable range of appropriate management technologies and how they manage the proportioning of the waste streams in their area to those technologies. If properly applied it can push waste management beyond just the

Other Waste Streams

The main focus of this consultation paper is on municipal solid waste (MSW). The Area Waste Plan must eventually cover all waste types. The other waste streams are listed below.

Commercial Waste

As a significant percentage of commercial waste is similar in composition to household waste, it has been assumed that the BPEO for household MSW will also be the BPEO for privately collected commercial waste.

Industrial Waste

Industrial waste is produced from manufacturing processes, utilities and transport operations. It is a waste stream with a widely varying composition and information on this is limited. Unlike MSW, where the local authority decides how all the waste should be managed, the decisions on how to manage industrial waste are made by the individual producer or in conjunction with the contractor handling the waste. Work on developing options for industrial waste will take place whilst the consultation on MSW and the first draft of the Area Waste Plan is proceeding.

SEPA is working on 13 Priority Waste Stream Projects, which will collect data and develop solutions for dealing with certain wastes, many of which are classed as industrial waste. Findings of these projects will be fed into the Area Waste Plan as they become available. The priority waste streams are:

- construction and demolition waste,
- waste electronic and electrical equipment,
- tyres,
- CFCs and other ozone depleters,
- packaging waste,
- newsprint,
- end of life vehicles,
- special waste,
- batteries,
- waste oils,
- clinical waste,
- agricultural waste,
- household hazardous waste.

Construction and Demolition Waste

Construction and demolition wastes are broadly similar and include soil, aggregates, bricks, clays, stone, timber, metals, plastics and contaminated materials. Again data is limited, with much waste being disposed of under exemptions from waste management licensing. Construction and demolition wastes are the subject of a priority waste stream project.

3 Determination of the Proposed BPEO

This section looks at how the group analysed the options to identify what they think should be offered for consideration as the best practical way forward for dealing with municipal solid waste across the whole area. The underlying premise is that each local authority should be able to identify a focused strategy that will deliver the BPEO for their area.

3.1 Appraisal of Generic Options

The options were appraised using SEPA's option appraisal matrix and national decision-making criteria (see Section 1.3). The local authority officers in the group undertook this work, with SEPA facilitating the exercise. The criteria were scored 'a' to 'd', where 'a' is best and 'd' is worst. A summary of the results is given in Table 3 below.

Table 3 Comparison of Options

National Criteria	Option					
	A	B1	B2	C	D	E
Air, land and aquatic environment	d	a	*c	a	b	b
Cultural heritage	c	b	d	c	d	c
Global climate change	*c	c	*b	b	b	b
Local amenity	d	d	e	d	e	c
Natural heritage	d	c	d	a	d	b
Non-renewable resource use	c	a	*b	a	*b	a
Accidental risks	b	c	e	d	e	c
Overall costs - cost and operational costs	d	d	c	d	e	b
Financeability, affordability	d	d	c	d	e	b
Impact on local economy	b	c	e	b	d	b
Employment (all options are +)	e	a	d	c	d	b
Making producers responsible	b	a	a	a	e	b
Public acceptability	e	b	c	b	e	b
Skills base	c	b	c	c	c	b
Social implications (poverty, exclusion and access)	c	a	d	b	c	b
Flexibility	c	a	c	a	d	a
Making the best use of existing facilities and expertise	b	b	b	a	d	b
Practical deliverability	c	b	d	c	d	b
Technical feasibility	b	a	b	a	b	c
Compliance with other policies	c	b	b	a	d	b
Overall Rating	d	b	c	b	d	b

*ratings provided direct from WISARD analysis

Brief Description of Options	
Option A	Extend existing practices (more civic amenity and bring facilities)
Option B1	Maximise recycling using clean MRF
Option B2	Maximise recycling using dirty MRF
Option C	Multi-composting
Option D	Maximise energy from waste
Option E	Maximise flexibility

The results are unweighed. That is, each of the criteria is given the same relative importance. Given this, there is a clear presumption in favour of options B1, C and E.

As stated in Section 1, the options are generic in that they do not go down to the level of the specific types of systems and technologies used. This caused problems in carrying out the appraisals as the officers had to make assumptions about the delivery of the options. Copies of the full appraisal tables for each option, including details of the assumptions used, are available on request.

This approach made validation of the ratings for the national criteria important. The group employed several tools to help in this process, namely:

- WISARD (life cycle analysis tool) - to validate the environmental impacts;
- a technical yield model - to validate the practicality of the option in delivering the diversion targets;
- a costing model - to validate the capital and operational costs of the options.

3.2 WISARD Life Cycle Analysis

Introduction

Assessing the environmental costs and benefits of the various options is central to the BPEO process. Until recently, getting transparent and objective data to guide such decisions has been problematic. Recent application of life cycle assessment (LCA) to waste management planning, specifically the development of the software tool WISARD, has now provided a means of achieving this.

WISARD applies life cycle methodology to strategic waste management planning and allows a direct comparison of a number of options. It does not provide the definitive answer, and is not intended to do so. But it does provide a powerful aid to decision making.

It must be remembered that the results from WISARD are potential impacts. They do not give a measure of the actual impacts. Wider issues such as time, and the capacity of the receiving environment to absorb a particular emission should also be taken into account. These issues are not covered in this report as specific local knowledge is required.

Like all software models there are constraints and assumptions have to be made. This is particularly true at when the greatest problem is the general lack of good quality data. Copies of the full WISARD analysis report are available on request. This report lays out the assumptions made, gives some details of the models and an interpretation of the results.

Results

The results were interpreted using eight impact assessment tools. Where necessary, individual scenarios have been analysed for high or low emissions of specific substances.

The assessment tools were chosen to match as closely as possible the priorities laid out in SEPA's Environmental Strategy. Three are considered to be of national importance, and should be taken into account by every group. The other five are of local importance and should be taken into account when individual Waste Strategy Area Groups consider them relevant to the local situation.

Table 4 Impact assessment tools of national importance

Issue	Impact Assessment
Climate Change	IPCC-Greenhouse effect (direct, 20 yrs)
Natural Resource Depletion resources	Ec(R*Y)-Depletion of non renewable
Depletion of Stratospheric Ozone	*CML - Depletion of the ozone layer – high

Table 5 Impact assessment tools of local importance

Issue	Impact Assessment
Health Risks from airborne pollutants	*USES 1.0-Human Toxicity
Accumulation of toxic chemicals in Scotland's waters	*USES 1.0-Aquatic Toxicity
Accumulation of toxic chemicals in Scotland's soil	*USES 1.0-Terrestrial Toxicity
Eutrophication of surface waters	CML-Eutrophication (water)
Acidification	CML-Air Acidification

SEPA developed a matrix to assist in the interpretation of the results. The matrix looks at the results in two ways: firstly, without any weighting on the relative importance and/or accuracy of the impact tools used; secondly using a weighting factor to try and reflect the relative importance and/or accuracy of the impact tools used (see Table 3).

It must be noted that this matrix is simply a tool to assist in interpreting the results from WISARD. There is no scientific or statistical basis to the weightings. They are ranked subjectively on the basis of the relative accuracy of the impact tools available, and/or the relative importance of the impact. It simply lays out in an easily understood way the subjective judgements made when assessing the first set of results.

1. Greenhouse Effect

Five of the six options show an avoided impact from carbon dioxide. Option C has a small impact from carbon dioxide from composting and energy from waste operations.

There is however a clear distinction between options A, B1 and B2, and options C to E. The latter three have a much higher energy from waste content, the former have a higher landfill content which accounts for the high methane.

Options D and E perform the best overall and have not been separated in the ranking, option C has a poorer but still good performance. The other three options all perform poorly in this category.

2. Ozone Depletion

The results for ozone depletion reflect very much those for global warming with options D, E, and C, in that order, being the best options. The other three all show a significant impact from CFC12, again this being a function of the landfill element of the models.

3. Depletion of non-renewable resources

The results for depletion of non-renewable resources are less clear-cut than the previous two results. However, again, options C to E are significantly better than options A to B2.

Options D and E ranked as the best options with C third.

4. Air Acidification

All options have a significant avoided impact from sulphur dioxides. However, options C to E do show a small but significant impact from nitrogen oxides from energy from waste plants.

However again the latter three overall perform better than the former because of the replacement of landfill with energy from waste. Option E is the best, followed by options D and C.

5. Eutrophication

The primary impact from options A to B2 is phosphates from landfill operations, with significant impacts from chemical oxygen demand, both a result of landfilling.

Option C shows a high impact from nitrates from composting operations and options C to E have significant impacts from nitrogen oxides from energy from waste plants, which shows as a small avoided impact in options A to B2 from landfill. Overall, however, option D performs marginally better than E, with option C the next best performer.

6. Toxicity

As stated above, LCA is not the most appropriate tool for looking at toxicity effects. However, it can be a useful guide and three tools, human, aquatic and terrestrial toxicity, were used to look at toxicity effects.

The results for human and aquatic toxicity are very similar with options C to D showing significant avoided impacts from beryllium. The other options all have significant avoided impacts from beryllium but at lower levels. Options C to D, however, do have small impacts on human toxicity associated with cadmium emissions associated with energy from waste.

Options C to D all show significant terrestrial toxicity impacts associated with mercury from incineration, but with significant avoided impacts from vanadium and beryllium.

It is very hard to rank the options in order of toxicity, but for human and aquatic the best option is D. However, these benefits may be offset given the mercury impacts associated with terrestrial toxicity. An attempt to rank the options on toxicity was made in the life cycle analysis matrix, however, as with all the rankings the group may wish to put their own interpretation on the results.

Conclusions

There is a clear difference between options A to B2 and C to E, resulting from the move from landfill to energy from waste.

The options were ranked solely on environmental grounds, and without taking local factors into account, the results are summarised in Table 6 below.

Table 6 Summary of options ranking

Unweighed		With weighting	
Option A	6	Option A	5
Option B1	4	Option B1	6
Option B2	5	Option B2	4
Option C	3	Option C	3
Option D	1	Option D	1
Option E	2	Option E	2

The weightings used reflect the impact tools of national importance (as set out in Table 4)

It should be noted that WISARD has a wide range of impact assessment tools. These compare the results in terms of specific environmental impacts, such as global warming. Simply using the bulk inventory comparison will not give detail on specific impacts rather it will give details on individual compounds or resources, such as methane emissions, when other greenhouse gases may be present. Copies of the full WISARD analysis and report are available on request.

Technical Yield Analysis

The options put forward for consideration were based on two principles. Firstly, there are only a limited number of things you can physically do to waste. Secondly, as set out in Section 1, the options should be considered generically across the whole strategy area. The physical process identified for treating waste was set out as: composting, recycling and recovery of value (either thermal or chemical). It has to be recognised that a whole range of technologies can be encompassed within these broad descriptions. The generic modelling is not intended to specifically exclude any particular approach. For example, whilst energy from waste has been modelled on incineration, this does not exclude other processes, such as pyrolysis, gasification or anaerobic digestion, from detailed consideration when the local authorities look at how to implement the preferred BPEO option. A critical element that any option must satisfy before it can be considered further, is its ability to deliver the diversion targets. The table below summarises the potential of the options to deliver those targets. It should be noted that the technical yields were modelled against the upper and lower projected rates for waste growth over the period of the plan. Full details of this approach and the results are as set out in the SWMBA and its appendices.

The model sticks to the format of the group in trying to gauge a range of possible uptake rates and yields, rather than setting a dubious single figure. As a consequence the options were modelled on possible percentage minimum, average and maximum yields. The figures were culled from UK case studies, trials and pilot programmes. The modellers also had to make assumptions about the systems used to deliver the options, and the flows of materials round the systems to estimate the yields. Copies of the technical yields models and results are available on request.

Table 7 demonstrates the ability of an option to deliver the diversion targets under both favourable and adverse conditions. The greater the amount of waste produced, the harder it is for less flexible options to cope. The table, therefore, also allows a certain amount of judgement of the risk involved in pursuing a particular strategy.

It should be noted, however, that the model does not assess the availability of markets for recovered and/or recycled materials. It assumes that all the materials can be used and will be taken up by an appropriate market for use.

Table 7 Achievement of Diversion Targets

waste growth projection	Recovery rates for materials	2010			2013			2020		
		Min	Average	Max	Min	Average	Max	Min	Average	Max
	Option A									
	0%	X	Y	Y	X	X	Y	X	X	X
	2%				X	X	X	X	X	X
	Option B1									
	0%	X	Y	Y	X	X	Y	X	X	Y
	2%				X	X	X	X	X	X
	Option B2									
	0%	Y	Y	Y	X	Y	Y	X	X	Y
	2%				X	X	X	X	X	X
	Option C									
	0%	Y	Y	Y	Y	Y	Y	Y	Y	Y
	2%				Y	Y	Y	Y	Y	Y
	Option D									
	0%	Y	Y	Y	Y	Y	Y	Y	Y	Y
	2%				Y	Y	Y	Y	Y	Y
	Option E									
	0%	Y	Y	Y	Y	Y	Y	Y	Y	Y
	2%				Y	Y	Y	Y	Y	Y

Note: X does'nt deliver targets, Y means it does.

Analysis of results

Option A clearly is only likely to meet the first target (2010) under the most favourable circumstances of low waste growth and maximum possible participation and yields. It fails to meet the other targets and should not be considered further.

Options B1 and B2 comfortably meet the first targets but struggle thereafter. In terms of delivering the subsequent targets, any strategy solely dependent on one of these options would have to be considered a very high risk. The options will only deliver under the most favourable circumstances of low waste growth and maximum participation and materials yielded. As stated previously, the model assumes the availability of markets for the recycled materials. This ignores possible quality issues regarding the suitability of the materials recovered for recycling. More importantly it ignores Scotland's lack of recycling infrastructure. A key strand of the National Waste Strategy is to develop both the infrastructure and sustainable markets for recyclates. A strategy that pursues the early delivery of these materials without a mechanism linking their delivery to the development of the markets etc. runs the risk of creating a glut of materials and possibly destabilising the emerging markets and facilities.

Option C on paper appears to comfortably meet all the targets. The hidden problems likely to affect this option are the effects of changing legislation and environmental enforcement. This multi-composting option faces the challenge of change in almost all of its elements.

- Quantities of waste calculated as going to home composting are not attributed towards local authority performance indicators (for recycling levels etc.). Home composting can contribute to meeting the diversion targets, as the measurement used to assess delivery is the amount of BMW actually landfilled.
- In the aftermath of foot and mouth disease, the legislation covering the suitability of compost for specific purposes is changing. In particular, compost derived from materials that may contain, or have even come into contact with, food waste will not be suitable for arable use. There is also the possible introduction of thermal or chemical treatment requirements (as yet undefined and unspecified). The whole situation is being reviewed by DEFRA and the Scottish Executive. The implications are that composting would have to be split between high quality green composting of non food waste (a significantly smaller proportion of the waste stream) and dirty composting. This dirty compost would only be suitable for use in areas where it would not come into contact with animals and livestock.
- A major factor in securing the diversion targets for this option, is the use of in-vessel composting of MSW. In this process relatively unsorted waste is shredded then composted it in a large sealed container. The resultant material contains high levels of shredded plastics, glass and other contaminants - including the hazardous elements that are common in household waste. Whilst the material is significantly reduced in weight and volume (mostly from loss of water vapour) it is questionable whether the material is a compost. This further ignores the questions that have been raised regarding the sustainability of producing a low quality compost merely to landfill it. The situation is currently under review nationally.

Given the high level of uncertainty regarding the proposed changes, it is hard to model this option realistically. If modelled against the changing proportions of material suitable for composting and the removal of in-vessel MSW as true compost, then this option will fail to meet the longer term targets regardless of growth and participation rates. Success of this option depends on high participation in the segregated green waste collection and development of a market for the compost produced. Offsetting this is the potential for local authorities to develop internal markets for their produce. On balance it appears more likely that this option would have to be harnessed to other systems to be sure of reaching the targets. It should be noted that options B1 and B2 both contained composting elements and were still regarded as a high risk.

Option D was modelled on one hypothetical large-scale incinerator serving the strategy area. Such an option could deliver the diversion targets, but only if sized properly. Most large-scale incineration processes have an upper and lower limit on the quantities of waste they will burn to be effective and economically viable. Under such conditions the scope for developing recycling and composting would be restricted to a role supporting the energy value of the waste being used as a fuel. Recycling etc could only be meaningfully developed if waste levels continued to grow at rates well in excess of the capacity of any plant. As stated in Section 2, this option does not fit easily with SEPA policy; being large-scale and involving the mass burn of relatively unsorted wastes. The scale of such an operation is not regarded as sustainable, being only one step up the waste hierarchy. Given the area within which it is being considered, it is unlikely to provide the BPEO.

Option E is designed to pick the best elements of the other options and apply them in an appropriate format to meet the specific local authority needs. In particular, the option seeks to bridge the areas of uncertainty, the high risk and the delivery gap, which most of the other options display in trying to reach the later diversion targets. In general terms it allows:

- composting to be pursued at a level the local authorities can support and find internal markets for, without necessarily using the ethically questionable in-vessel MSW composting;
- recycling and/or recovery for re-use to be pursued in a flexible manner that can adapt and respond to changes in both the market and the development of Scotland's infrastructure; and
- delivery of the later diversion targets through the adoption of small-scale modular and flexible technologies (such as pyrolysis, gasification or anaerobic digestion) that do not minimise and/or undermine the development of composting and/or recycling.

In modelling for the technical yields, this option was found to be very responsive. It could deliver the targets using a diverse range of different proportions of materials going to the different elements. It could also use a wide range of different technologies and systems. It further performed well under a wide range of adverse scenarios.

A further bonus is that option E allows maximum flexibility to each of the local authorities in their practical application to meet their needs. As pointed out (SWMBA and Section 1) the local authorities are operating under different contract periods, using different structures and systems. This approach lends itself to being introduced on a modular basis (if appropriate). If introduced on a modular basis, there is also potential for systems to be linked or shared at later stages in the process, as technologies, markets and/or circumstances change.

This option also allows forward contingency planning. Should the most favourable conditions be achieved under which a mix of composting and recycling can deliver the diversion targets, then the introduction of an additional technology layer may not be necessary. This issue really becomes one of risk management for the individual local authorities in delivering their statutory responsibilities for managing MSW.

Costs Analysis

Cost analysis was carried out for SEPA by Enviros Aspinwall. The results are indicative only. The generic nature of the options meant that assumptions had to be made about the systems that could be used, and possible flows of wastes through those systems. In particular, the costs were modelled on the likely levels of waste at 2010 assuming a 2% per annum growth rate. A copy of the full report, including these assumptions and mass balances, is available on request.

The results in Table 8 indicate that a mass burn option, though meeting the diversion targets, has the greatest capital costs. Of the remaining options, only option E meets the long-term diversion target (using the costs modelling assumptions). It should be noted that option E was modelled using the costs for a small-scale pyrolysis or gasification plant (cheaper than traditional, larger, mass burn incinerators) and anaerobic digestion costs were not modelled. It should further be noted that the recycling options B1 and B2 were modelled at the maximum participation rates and yields at which they might deliver the diversion targets.

Table 8 Summary of Indicative Costs

Cost Summary (£ millions)	Option A	Option B1	Option B2	Option C	Option D	Option E
Disposal						
Cost	13.5	8.0	20.8	23.0	27.5	14.7
Operational fraction	3.7	5.1	1.8	2.8	6.4	8.3
Capital costs	8.0	24.8	6.5	14.3	86.1	98.4
Collection						
Cost	11.3	15.2	9.5	11.8	11.2	13.1
Containers	0.3	16.9	1.2	1.4	0.0	8.3
Operational fraction	0.4	0.3	0.4	0.3	0.4	0.3
Capital costs	0.9	0.6	0.9	0.6	1.0	0.6
Revenue (material sales)	0.4	7.1	4.2	6.5	1.8	5.9
Collection	11.3	15.2	9.5	11.8	11.2	13.1
Disposal	13.5	8.0	20.8	23.0	27.5	14.7
Total	24.8	23.2	30.3	34.7	38.7	27.7

Note: Data used to calculate indictive costs are outlined in Table 9 on page 28.

Table 9 Waste Management Costs

System	£/tonne
Mixed MSW collection	26
Kerbside paper	40
Dry recyclables	40
Blue box recyclables	40
Green waste collection	40
Wet waste collection	40
Bring site	50.5
Civic amenity site	48
In vessel composter	20
Windrow composter	14
Clean MRF	15
Dirty MRF	15
Energy from waste presorted	40
Energy from waste	40
Landfill (non hazardous)	36
Landfill (hazardous)	150

3.3 Final results - Proposed BPEO

The group proposed option E as the BPEO for the Waste Strategy Area. Table 10 shows a summary of the findings from all the elements of the foregoing analysis.

Table 10 Summary of Final Results

	Option A	Option B1	Option B2	Option C	Option D	Option E
Diversion targets	No	Unlikely	Unlikely	Unlikely	Yes	Yes
Costs (£M)	24.8	23.2	30.3	34.7	38.7	27.7
Ranking in WISARD impacts	6	4	5	3	1	2
Options appraisal	D	B	C	B	D	B

The BPEO is regarded as the best practical option. It is defined as "... the option that provides the most benefits or least damage to the environment as a whole, at acceptable cost, in the long-term as well as in the short term". Given the statutory requirement to deliver the diversion targets, option E is proposed, on balance, as the preferred way forward for the waste strategy area.

4 Local Authorities' Proposed BPEO Implementation

This section presents the way that each local authority intends to deliver the proposed BPEO.

4.1 Ayrshire, Dumfries and Galloway Area Waste Plan

Area Waste Plans

European Law on Waste Management states that the current practice of landfilling some 97% of Ayrshire and Dumfries and Galloway's rubbish will no longer be acceptable. More sustainable approaches, such as recycling and composting will have to be encouraged, in the home or in industry, if Scotland is to meet the targets set by Europe.

Working towards these targets, SEPA published the National Waste Strategy: Scotland in 1999. This strategy identifies Ayrshire and Dumfries and Galloway as one of eleven areas, covering the whole of Scotland, each of which is responsible for producing an Area Waste Plan. Each plan will take its individual area's social, economic and environmental factors into consideration. Together they will ensure that Scotland meets its targets.

The aim of this plan is to show how the four local authorities (North Ayrshire, South Ayrshire, East Ayrshire and Dumfries and Galloway) collect and dispose of their waste and to suggest other methods which are more environmentally friendly and sustainable. These systems have to be able to meet the targets set out in the EC Landfill Directive, regardless of how the types and amount of waste change and grow over the twenty-year period of the plan. For the Area Waste Plan to take shape, relevant data was collected on the amounts of household and industrial waste being collected by the local authorities and how much of this was being landfilled or recycled. This information has been recorded in the Strategic Waste Management Baseline Assessment (SWMBA) and the underpinning data will be used to form the process that the councils wish to implement in their development of their strategy for their authority.

Key Drivers for Change

All the authorities in the waste strategy area recognise three key drivers in the need to change the way waste is managed in Ayrshire and Dumfriesshire:

- Firstly, there is the impact of European policies on the environment and the European response to the United Nations Conference on the Environment and Development in Rio 1992.
- Secondly, there is the importance of developing the global economy and need for Ayrshire and Dumfriesshire to ensure that Scotland's economy is sufficiently efficient to compete in the UK, European and global contexts.
- Thirdly, there is a direct effect of specific legislation such as the EU Landfill Directive.

Of the above, it could be argued that the legal requirement to divert BMW from landfill is the most powerful short-term driver. It sets out statutory targets, which must be met over a specified time period. A summary of these targets is detailed below:

1. Reduction in the levels of BMW going to landfill. Specific targets are:
   - 75% of the 1995 levels by 2010,
   - 50% by 2013, and
   - 35% by 2020.
2. Barring most whole tyres from landfill by 2003 and shredded tyres from 2006.
3. No disposal of liquid waste, infectious clinical waste or explosives, oxidising or flammable waste to landfill by 2001.
4. No co-disposal of hazardous and non-hazardous waste.

The target that will have most direct impact on the councils, as waste disposal authorities, will be the need to reduce the levels of biodegradable municipal waste going to landfill.

It should be noted that the 1995 baseline figure stems from data reported to the European Commission. This indicated a total of 2.8 million tonnes of waste being disposed of nationally in Scotland. There is as yet no agreement on which methodology will be used in dividing up this sum between areas. Clarification is critical, as this will have a significant bearing on the obligations to be met by each Scottish local authority.

The figures used in this report are:

- those provided to the Scottish Executive for the Waste Management Cost document (commissioned from Enviros Aspinwall), and
- those used in developing the SWMBA tables for waste growth (as provided to SEPA).

It should be noted that the councils are comfortable with the SWMBA tables of figures as they are validated and verifiable through both the councils' own and independent audit systems.

4.2 East Ayrshire Council

Current Position

East Ayrshire Council does not operate any landfill sites of its own. There are six licensed facilities, all private. Three of these are small part time operations. The other three provide the major part of the area's capacity for dealing with active waste. Together these provide a waste handling capability of approximately 2,500 tonnes per day and a disposal capacity of about 50,000 cubic metres per annum in the local authority area.

The council's civic amenity sites have separate skips and containers for the deposit of garden waste, wood, metals, glass, paper, cardboard, textiles, oil, etc., which are all passed on for recycling. In addition, the council provides a number of glass and can recycling banks strategically located throughout the district. The council has already increased its recycling initiatives, and is exploring additional options, for example the kerbside recycling initiatives at Fenwick and Mauchline will be expanded throughout the council area during 2002.

East Ayrshire Council has a five-year contract for the disposal of waste with a private contractor. This contract has been re-negotiated, as part of the two-year contingency proposals within the contract, and a two-year extension agreed. This extension ends in May 2003.

East Ayrshire Council supports entirely the aims of the National Waste Strategy for Scotland and fully intends to comply with the diversion and recycling targets outlined in the EC Landfill Directive.

BPEO Implementation

The council has consequently decided to continue to seek the provision of its waste treatment and disposal through contract and the Best Value process. It has agreed that the tender documents for the council's new waste treatment and disposal contract (due to commence in May 2003) will require all bidders to demonstrate that their proposals meet the BPEO approach in accordance with the area waste planning process.

It is noted that the development of the council's strategy has to accommodate the development of the Area Waste Plan. Proposals regarding the introduction of a new strategy, will need to be carried out with full public consultation, in accordance with the principals of the Area Waste Plan. Such proposals will seek to ratify the general BPEO established by the plan.

Best Value Contract

The new waste collection, treatment and disposal contract is scheduled to commence in May 2003 for an initial fifteen-year period with five one-year optional extensions. Bidders will be required to recognise the council's waste collection, recycling and treatment facilities and incorporate these in a strategy, which will allow compliance with the Landfill Directive diversion targets.

East Ayrshire council currently offers a weekly waste collection service (the majority of this being on wheeled bins) from all domestic premises in East Ayrshire.

Since 1998, the council has progressively increased the number of bring waste recycling sites throughout the council area following extensive consultation with seven local committees.

In 1999, pilot kerbside schemes were introduced to the villages of Fenwick and Mauchline. These pilot schemes were mainstreamed in 2001.

All material collected in the kerbside schemes (together with some of the material from the bring sites, is taken to a materials recycling facility (MRF) at the council's Western Road Depot. This facility was commissioned in 1999 following a successful challenge bid for capital funding from the former Scottish Office in 1997.

As part of the council's commitment to a progressive increase in recycling, the kerbside recycling schemes will be increased during the summer of 2002 to include Lugar, Craigens (Cumnock), Doon Valley, Cumnock, Grange (Kilmarnock), Newmilns, Bellfield (Kilmarnock), Stewarton, Ochiltree, Skerrington (Cumnock) and Southcraigs (Kilmarnock). This will more than treble the number of premises offered a kerbside recycling service and effectively mean investment in an additional vehicle and crew, together with additional employees for the MRF. This extension of kerbside collection is being partially funded by additional monies provided by the Scottish Executive for the expansion of recycling activities.

While the EU procurement procedure obviously limits the nature of the specification of the new waste management contract, bidders will be expected to take account of the council's commitment to an incremental improvement in waste recycling performance year on year. If however any bidder submits a proposal that accelerates the Council's recycling performance (or indeed was to, say, achieve the 2013 diversion target by 2010) then this could be a significant factor when tender evaluation is completed.

Potential bidders will also be reminded of the commitment to joint working shared by the three Ayrshire authorities, East Ayrshire being the lead authority for the waste management function. The MRF at Western Road, Kilmarnock already processes recyclate collected by the other two authorities. There is also evidence of procurement contracts for the collection, storage, treatment and disposal of fridges in which North and South Ayrshire may join with East Ayrshire Council.

Performance parameters

East Ayrshire Council is committed to achieving a flagship solution to its waste treatment and disposal requirements within its authority. In setting the parameters for the new waste disposal contract, all applicants have been made aware of the requirements for their proposals to fit with the finalised version of the Area Waste Plan and, in particular, to demonstrate clearly the BPEO within East Ayrshire. Further, the applicants must be in compliance with the council's Best Value and environmental strategies.

In assessing the performance requirements for compliance with the Area Waste Plan and determining the BPEO, the council has clearly set out its commitment to increasing recycling in all forms and moving towards minimising its dependence on landfill. An initial review of the presentations made by interested applicants has encouraged the council to set the following targets and objectives.

EU landfill diversion requirements

Minimum EU landfill diversion requirements must be achieved as a statutory requirement – targets as modelled are detailed in the table below.

Table 11 Diversion targets expressed as a percentage of the total estimated waste, rounded to nearest whole number.

	Diversion Target Date		
Modelled at	2010	2013	2020
Minimum growth (0%)	11%	27%	36%
Maximum growth (2%)	27%	39%	47%

(adapted from SWMBA Appendices 2 and 3)

Diversion from landfill targets

As stated, the council is committed to minimising the dependence on landfill. The council does not operate any landfill sites of its own and in terms of the approved Structure and Local Plans (taking account of the implications of the EU Landfill Directive) is of the view that the existing licensed landfills within its area have sufficient capacity to accommodate any future waste disposal proposals offered by any of the applicants.

If, however, any applicant offers a system where the council's waste is to be taken for treatment to a facility outwith the council area, the applicant will be required to demonstrate BPEO and that the statutory diversion targets will be met. Given a review of the technologies available and in keeping with the ranged approach adopted by the Waste Strategy Area Group, it sees the achievement of diversion away from landfill (using all sources of waste management treatment) between 60% and 80% and the landfill dependency range of between 40% and 20% as being eminently achievable within the contract period.

Timescale for Achievements

East Ayrshire Council views the statutory diversion percentages as being the minimum standard to be delivered by the applicants.

In the evaluation of proposals submitted, due weighting and cognisance will be given to any individual proposal which offers diversion targets which can be delivered earlier than those set out in the Directive. Applicants will therefore be required to set out clearly the amount of BMW being diverted by the statutory dates (2010; 2013; 2020).

Recycling Objectives

The council wishes to set a minimum recycling threshold target of 25% to be achieved within twelve years of the issue of the contract. Given the council's current commitment to expand waste recycling, no upper limit will be set in the contract for recycling.

Note: In using the term recycling, the council means all forms of recycling including inert materials recycling and composting.

Delivery and Assessment

Subject always to the council's procurement procedures, assessment of the options put forward by applicants will be undertaken to ensure that the BPEO is delivered. The assessment process for BPEO is that indicated in Part 2 Section 3 of this consultation document, in compliance with National Waste Strategy guidance and the area waste planning process.

Assessment of the options put forward in terms of Best Value will be undertaken in accordance with the council's Best Value strategy and appropriate guidance from the Scottish Executive.

It should be noted that the BPEO and Best Value processes are viewed as being mutually inclusive therefore preference will be given to that option that demonstrates the best balance between social, environmental and economic impacts.

Applicants will also be required to secure planning permission as necessary for new facilities. Planning applications will be considered in relation to development plan policies, and will require to be supported by environmental impact information conforming to the relevant planning regulations.

4.3 North Ayrshire Council

Current Position

North Ayrshire has a tradition of self-sufficiency in its waste management arrangements. Currently waste disposal is carried out at a landfill site at Brodick, serving the Isle of Arran, and a landfill site at Shewalton, Irvine, serving the mainland and the island of Cumbrae. As detailed in the SWMBA, the landfill site at Shewalton is intended to operate until August 2004, subject to satisfactory outcome of discussions with SEPA. Thereafter it is proposed to make use of another area of Shewalton for which planning permission is already in place and which should facilitate another eight to ten years of landfill (allowing for EC landfill diversion requirements). This latter site will be fully contained and will require a IPPC application to SEPA. Consultants have already been tasked with obtaining the necessary information to facilitate such an operation.

North Ayrshire Council has recently gained planning permission for a major site at Bogside near Irvine, which would meet their long-term disposal needs for mainly inert waste.

The Way Ahead

Determining the way ahead, a number of factors have to be flagged up at this stage:

1. It is obvious to elected members and officers of North Ayrshire Council that one option which cannot be pursued is to do nothing.
2. In the absence of an agreed final Area Waste Plan it was not thought appropriate to press ahead with any long-term developments involving significant capital input until the plan is finalised.
3. Notwithstanding point 2 above, it should be noted that the council supports and actively participates in the development of the Area Waste Plan to the extent that they recognise the validity of the data in the SWMBA, and agree with the initial options appraisal, which identified a broad generic BPEO.
4. The council has tried to adopt a forward thinking strategy which takes the above factors into consideration and has moved to propose the way ahead as a pragmatic means of both implementing the BPEO within North Ayrshire and setting out a modular system for meeting their MSW needs over the period of the plan.

The BPEO Context

Given the foregoing, the North Ayrshire Council wishes to establish the BPEO for dealing with waste within its area using the self-sufficiency policy to which it subscribes. It should be noted that the council is a strong believer that this policy delivers the aims of the proximity principle in dealing with its own waste.

It is noted from its work on the Area Waste Plan, that there are substantial risks in adopting a long-term plan, notably:

1. Rapid changes in new and emerging technology;
2. Rapid changes in legislation;
3. Potential long-term risks in being tied to one specific technology which becomes outdated; and
4. Financial risk to committing to a programme, given legislative and technological uncertainties.

The council therefore proposes to implement a modular strategy aimed at:

1. Timeously introducing specific modules to meet the requirements of the EC Landfill Directive; and
2. Using the timescale of the introduction of the various modules to explore and expand its recycling activities and development of flexible and integrated waste management systems.

It is believed that such an approach produces a risk management strategy that will minimise the risk to the Council. Further, such an approach allows the clear identification of methods to meet the Landfill Directive and methods to boost sustainability beyond merely legislative targets.

The proposed mechanism for introducing the system is rolling out the Council's composting partnership with ICI and Tarmac Recycling Ltd. The system will be rolled out as the first module. The specific aim will be to achieve the 2010 targets. The secondary aim will be to enable the council to devote sufficient time, effort and detail into delivering the aspirations stated above.

It is believed that such a time-phased introduction of a modular system forms an acceptable proposal. Specifically, it clearly indicates the council's commitment to the aims and objectives of the National Waste Strategy and follows the same principles set out by Forth Valley in its Draft Area Waste Plan.

The Proposal

During the financial year 1999-2000, North Ayrshire Council recycled or composted 3.6% of its municipal solid waste. During the period 2000 to 2001 this figure increased to 8%, primarily as a result of a scheme for composting green waste. This scheme, known as The Perfect Blend is a partnership between ICI, North Ayrshire Council and Tarmac Recycling Ltd.

Since the closure of ICI's Combined Heat and Power (CHP) plant, the company needed a disposal route for up to 600 tonnes of nitrouscellulose waste. This is a biodegradable special waste for which no suitable licensed disposal facilities are available in Scotland. The council, at that time, collected 8,000 tonnes of garden refuse each year and disposed of it mainly by landfill. In line with landfill reductions targets and commitments to sustainable development, the council needs alternative disposal methods. Tarmac Recycling Ltd is a waste management company that is looking to develop and utilise its composting expertise and gain new contracts.

The concept is that by blending these materials and expertise, quality compost will be produced. North Ayrshire Council has issued 12,350 brown bins to collect garden waste and has 5,650 more in stock. The expectation is that the council's 2010 diversion targets will be met by rolling out the green waste collection scheme throughout its area. Analysis of the potential yields against diversion targets for the expected growth rates of waste indicates that the diversion target is achievable (assuming an average participation rate of around 30%). It should be noted that forward projection against the 2013 target would indicate that this is only achievable at a zero growth rate for MSW, though it does come tantalisingly close to meeting the 2013 target at an expected 2% growth rate. (Figures from Appendices 2 and 3 to the SWMBA and NACs 2000-2001 waste returns). (Technical yield models and participation rates provided by SEPA).

It should be noted that the model assumes a proportionate rise in green waste alongside the estimated rates of waste growth. This is considered not unrealistic given the estimated substantial rise (21.4%) in household formation over the period of the plan, compared with a decline (0.4%) in population over the same period. (Information from SWMBA Table 5, page 12 and Table 6, page 13)

North Ayrshire Council intends only using brown bins to collect organic garden waste. This should avoid the problems encountered by food waste collection systems, as operated by some local authorities in England, which gave rise to complaints about smell and problems with maggots during the summer, contamination and the quality of the material collected. These issues are being monitored. At the time of printing, the scheme has been operational for over a year in some areas of North Ayrshire, with no reported problems.

Additional Factors

North Ayrshire Council is committed to further expansion of its recycling banks and civic amenity facilities, which should also result in an uplift in recycling figures. Increases in wood and paper collected would be used to augment the composting scheme. The council has recycling banks for paper, glass, textiles, aluminium cans, waste oil, etc. Steel cans and metals are extracted from the council's pulverisation plant. As stated previously, these systems contributed to the council's original 3.6% recycling rate.

Although the council has an ongoing commitment to boosting recycling, any major new schemes will only be undertaken within the second or third modules of the proposed roll out programme. Again this will only be after extensive consultation with the public to ensure that not only are the aims and objectives for the National Waste Strategy met, but also the aspirations of the public are met to the best advantage of the council.

2013-2020 Diversion Targets

As stated, North Ayrshire Council believes the initial proposal will meet the 2010 targets. However, it will not be possible to achieve the 2013 and 2020 diversion targets without the development of additional strategic modules for dealing with MSW. The council actively supports and participates in the development of the Area Waste Plan. It believes that its implementation of a strategic option to deliver the generic BPEO already identified, is best served in a modular fashion. This enables the council to manage the risks already identified above.

Without prejudice to the council's decision-making process, its officers are at an early stage in discussions with various third parties. They are exploring the possibilities of developing the Bogside landfill disposal facility with additional materials recycling. Such facilities would allow the diversion of MSW to composting or recycling. Such an approach allows time to assess the emerging technologies for suitability and sustainability. It further allows the council to assess their needs against the results achieved by the implementation of the first composting module, identified as The Way Ahead.

Proposed Roll Out of Modular Programme

Module 1	Primary aim to achieve 2010 targets
Roll out brown bin composting system	Now - 2004
Monitoring and assessment	2002 -2005
Research increased recycling facility yields	2002 -2004
Module 2	Primary aim to achieve 2013 targets
Development of Module 2	2004 -2006
Implementation	2006 -2008
Monitoring and assessment	2009 -2011
Module 3	Primary aim to achieve 2020 targets
Development of Module 3	2012 -2014
Implementation	2015 -2017
Monitoring and assessment	2018 -2020

Note all modular development will accommodate the development of the Area Waste Plan. Proposals regarding the introduction of supporting modules will be carried out with full public consultation, in accordance with the principles of the Area Waste Plan. This, also, will seek to ratify the generic BPEO established by the plan.

4.4 South Ayrshire Council

Current Position

South Ayrshire Council does not operate any landfill sites of its own, although it does operate one licensed waste transfer station and six licensed civic amenity sites within its area. South Ayrshire Council disposes of most of its municipal wastes at Garlaff Landfill site near Cumnock, through a 15-year contract agreement with Barr Environmental of Heathfield, Ayr. Wastes arising in the south of the district are disposed of at Straid Landfill, near Lendalfoot.

The council's civic amenity sites have separate skips and containers for the deposit of garden waste, wood, metals, glass, paper, cardboard, textiles, oil, etc., which are all passed on for recycling. In addition, the council provides a number of glass and can recycling banks strategically located throughout the district. The council has already increased its recycling initiatives and has introduced an extensive home composting project as a first step on the road to managing MSW in a more sustainable manner.

There are two private licenced landfill sites in South Ayrshire, at Tarbolton Moss and at Straid Farm, Lendalfoot. There is one licensed metal recovery facility at Ayr Harbour and one licenced waste transfer station at Saltpans Road in Ayr.

South Ayrshire Council supports entirely the aims of the National Waste Strategy for Scotland and fully intends to comply with the diversion and recycling targets outlined in the EC Landfill Directive.

BPEO Implementation

Given the foregoing, South Ayrshire Council has established an elected member and officer working group to determine the BPEO for dealing with waste in its area, using the generic BPEO model identified.

Building on the Waste Strategy Area Group's generic modelling, the council decided to place the emphasis on achieving its targets through maximising composting and recycling. It recognises that such an approach depends on high levels of participation and high yields if it is to deliver the 2020 targets. It is, however, much more inclusive and in keeping with the values expressed by the council. In order to manage the risk, South Ayrshire Council is effectively committing itself to achieving the 2020 targets by 2013. Such a timescale allows it to assess the position reached while still having sufficient time to respond if the systems put in place are not yielding the necessary results.

The decision to take this approach was adopted after the council's Waste Management Working Group considered the outputs from the Waste Strategy Area generic modelling, in particular, waste treatment technologies such as incineration, energy from waste, pyrolysis, end point separation etc, and extension of existing recycling and composting operations.

In adopting a strategy based on maximising composting and recycling, the council is committing itself to achieving the minimum requirements of the diversion targets, which have been calculated as (depending on growth rates):

a) For 2010 between 15 and 27%;

b) For 2013 between 30 and 39%;

c) For 2020 between 39 and 47%.

It should be noted that these are the diversion requirements for biodegradable waste only. The inert recyclable fraction (i.e. metals and glass etc) is calculated at between 20 and 30%. Approximately half of this material is regarded as being potentially recyclable. This would mean an additional 10 to 15 percent could be added to the diversion targets, giving a combined composting and recycling rate of 49 to 62% for all types of waste. Such a ranged approach fits with the methodology adopted by the Waste Strategy Area Group. It should be noted that the actual delivery of recycling targets is likely to fall within that range and that 62% is very much the upper limit envisaged by the council using current technology. This approach also means that the council is planning to cut its dependence on landfill from 92% to around 40% by the year 2013.

Building on the modelling work already undertaken by the Waste Strategy Area Group, the South Ayrshire Council proposes to examine all methods of segregating waste at source to maximise both the participation levels and the yields from whatever systems are eventually put in place. The council has already formed the project working team, which has consulted widely with other waste collection authorities in the UK and has visited and viewed kerbside recycling schemes in operation. In line with the council's strategy and the development of the Area Waste Plan, all options brought forward by the group will have to be fully assessed to ensure they deliver the BPEO. Further, in accordance with the principles of the Area Waste Plan the options will be subject to full public consultation before final development and implementation of a specific strategy that will meet the needs of South Ayrshire Council and the people in its area.

Options Appraisal

Building on the work carried out by the Waste Strategy Area Group the council carried out a full option appraisal on the various methods available for source segregating their waste collection. Given that the key aim of the segregation is to maximise the amount of material diverted away from landfill, the following four options were fully appraised:

1. A three bin system (similar to that introduced in West Lothian)

Green material is separated for composting and collected once every four weeks, dry recyclable materials are separated into a bin for recycling and collected once every four weeks. The mixed waste that is left, material unsuitable for recycling or composting, is collected on alternate weeks.

2. Two bins and a box

An additional bin is provided for green waste for composting and a separate box system for collecting dry recyclable materials. The bins are collected on alternate weeks and the box has a dedicated collection cycle.

3. Two boxes and a bin

This system does not collect material for composting. Two boxes maximise the materials that can be separated at source for collection. One box is likely to be dedicated to glass.

4. One bin, one box and survival bag

Again this system does not collect compostable materials, however the purpose of the box and the survival bag is to target specific materials, dry recyclable materials that can be recovered.

The results of the appraisal are outlined in Table 12, showing that the three bin system performed the best. The following factors were further taken into account:

Technical Yields

The three bin system is an opt out system, in other words the provision of the bins is mandatory and, given the fortnightly collection service for unsorted wastes, householders participation is gained by the fortnightly collection effectively halving their unsorted waste bin's capacity. Work carried out in other parts of SEPA and by the main group identified that these kind of systems do give higher yield rates, which is vitally important if South Ayrshire Council are to achieve the maximised diversion and recycling objectives that they have set themselves.

Costs

The three bin system came out best in terms of costs and affordability. Essentially the only additional cost is providing bins for compostable material and recyclable materials. There is no additional revenue cost in terms of specialised vehicles, additional fleet required, additional manpower required etc. Effectively the same vehicles and manpower are undertaking the same work utilising the same routes etc employed by the old mixed waste collection system. The provision of boxes has additional dedicated fleet requirements plus additional manpower and indicative costs are that it operates at a gross cost of £100 per tonne of materials collected. The box system is effectively an opt in system that have been shown to have lower participation rates than opt out systems and consequently yields are lower therefore is a disproportionately high cost in terms of materials collected. Work carried out by South Ayrshire Council identified that the one-off capital costs of providing the bins works out cheaper over the ten year lifespan of the bins compared to the provision of survival bags over the same period of time.

Environmental Impact

Given that the three bin system does not add additional vehicles, routes and mileage, the council are attracted to the environmental benefits of not increasing impact to air pollution as well as noise, dust and nuisance to residents from additional vehicle movements.

Overall Recommendation

On balance, given the overall findings outlined above South Ayrshire Council Working Group identified the three bin system as that most likely to deliver their stated objectives of achieving the 2013 target as well as maximising their opportunities to assess progress towards the 2020 diversion targets. This strategy also affords maximum time to evaluate any additional elements and technologies that will be required to bridge any gap in achieving those targets.

Table 12 South Ayrshire Council Kerbside Recycling Schemes - Option Appraisal **Comparison Table**

Option	1	2	3	4
	Three bins	Two bins & one box	One bin & two boxes	One bin, one box & one survival bag
Air, land and aquatic environment	B	C-	C-	C-
Cultural heritage	A	A	A	A
Global climate change	B	C+	C-	C+
Local amenity	C	D	D	D
Natural heritage	C	C	C	C
Non-renewable resource use	B	C-	D+	C-
Accidental risks	C	D	D	D
Cost	B+	C-	C-	D
Overall costs - cost and operational costs	A-	D	D	D
Financeability, affordability	B+	B+	B+	B+
Impact on local economy	C	C	C	C+
Employment (all options are +)	C	A	A	B
Making producers responsible	A-	B	B-	C+
Public acceptability	B	B+	A-	B-
Skills base	C	C+	C+	C+
Social implications (poverty, exclusion and access)	C+	B+	B+	B+
Flexibility	A	A-	C+	C+
Making the best use of existing facilities and expertise	B+	C	C	C
Practical deliverability	B+	B	B	B
Technical feasibility	A	A	A	A
Compliance with other policies	A	A	A	A
Overall Rating	B+	B	B-	B-

Brief Description of Options	
Option 1	Three wheeled bins per household. One bin for green waste, one bin for dry recyclables collected on alternate weeks from residual waste bin. Local MRF and composting facilities, residual waste to landfill.
Option 2	Two wheeled bins and one 55 litre plastic box per household. One wheeled bin for green waste collected on alternate weeks from residual waste bin. Box for dry recyclables collected once per week. Local MRF and composting facility, residual waste to landfill.
Option 3	One wheeled bin per household for residual waste collected once per week. Two 55 litre plastic boxes for dry recyclables collected once per week. Local MRF and composting facility, residual waste to landfill.
Option 4	One wheeled bin per household for residual waste collected once per week. One 55 litre plastic box for dry recyclables emptied once per week and one survival bag per household per week.

Waste Minimisation and Reduction

South Ayrshire Council has already introduced an extensive home composting project, which has resulted in over 11,000 new home compost bins being distributed to householders. Work will continue to monitor and promote home composting in the district and to assess the value of the scheme in terms of diverting BMW from landfill.

The council also recently distributed over 51,000 Waste and Recycling Guides to householders in the district, providing information and assistance to householders on minimising and reducing waste.

Partnership Working

The council continues to work in partnership with all waste producers in an effort to deal with waste in a more sustainable manner. Additional recycling and recovery schemes for glass, paper, cans and cardboard have recently been introduced for commercial customers and garden waste collected separately at civic amenity sites is now composted centrally. Biodegradable beach waste is also transported for composting.

The council is a member of the Ayrshire Waste Management Advisory Group, which comprises officers of the three Ayrshire Councils and which meets regularly to discuss areas of common concern and promote joint working arrangements where possible. As indicated previously, the officer and member Waste Management and Litter Control Working Groups have been introduced to examine all aspects of waste and litter.

Waste Diversion

The recent initiatives introduced by South Ayrshire Council have resulted in a reduction of waste going to landfill over the past three years. An officer project group is determining the BPEO in terms of segregating wastes at source and whether drop-off recycling sites for some waste streams would be sufficient to achieve the relevant landfill diversion targets or whether more extensive kerbside recovery schemes would be required.

It is recognised that the householder has an important role to play in any source-segregated waste strategy and best practice examples of segregation schemes within the UK are currently being studied and evaluated. The council's project working team will study these various systems of to select the best one for achieving the maximum householder participation in recycling and composting.

Other waste streams that the council deals with, such as commercial and industrial wastes, special uplift of bulky wastes, civic amenity wastes and street and beach cleaning wastes will also be examined with a view to increasing recycling and composting and diverting waste from landfill.

Proposed Implementation of new Waste Management Strategy

The introduction of new source segregated collection schemes will depend to a certain extent on funding being made available from the Scottish Executive's Strategic Waste Fund. It is difficult to be precise, therefore, about exactly when or how quickly such segregation schemes will be introduced. The council is confident that it will meet the 2010 and 2013 landfill targets with a source-segregated collection strategy although some additional form of waste treatment may be required to achieve the 2020 targets. Should some additional form of waste treatment be necessary it would only be required for the remainder of council waste not recycled or composted. This strategy would also allow time to evaluate new waste treatment technologies, which will almost certainly become available over the next 20 years. These new technologies would include such treatment methods as pyrolysis, heat-treatment and energy from waste facilities.

Certainly, the approach being adopted by South Ayrshire Council is very ambitious, particularly when considered against its own calculations that, in the contents of the average domestic bin, 50% of the waste is compostable, 20% of the waste is recyclable and 30% is waste. The ranged approach being targeted i.e. between 49 and 62%, should be considered within this context. The option within the strategy to allow time to evaluate new waste treatment technologies offers the potential to ensure that the commitment to composting and recycling can be maximised and further demonstrates the flexibility of the process being adopted.

The following implementation strategy is therefore designed to eventually meet the 2020 landfill targets: -

Phase 1	**Strategy to achieve 2010 and 2013 targets**
Continue to promote waste minimisation and reduction, home composting etc.	Now – 2013
Introduce new source segregated collection schemes for household, commercial and industrial wastes	2003 – 2013
Introduce new segregated collection schemes for civic amenity, street and beach cleaning wastes	2003 – 2013
Monitoring and assessment of new segregation schemes	2003 – 2013

Phase 2	**Strategy to achieve 2020 targets**
Continue to promote waste minimisation, and reduction, home composting etc.	2013 - 2020
Continuation of new source segregation schemes	2013 – 2020
If necessary, introduction of additional waste treatment, evaluating new technologies etc.	2013 - 2020

It is accepted that the above strategy incorporates a broad timescale and it is only when the council has prepared its own Integrated Waste Management Plan will more precise details be available of the particular recycling, composting and diversion rates to be achieved during the term of the Area Waste Plan.

4.5 Dumfries and Galloway Council

Current Position

Dumfries and Galloway Council has seven licensed landfill sites. Three are operational and licensed to accept MSW. The other four are licensed but are in post closure and restoration stage, only taking inert waste by appointment. It is the council's intention to close and restore the main site in the east of the authority area (Lochar Moss) as soon as practicably possible. Aucheninnes near Dalbeattie will require re-engineering to meet containment requirements of the licence should it be extended to take on the mantle of the authority's main site. The third active site at Galdenoch, Leswalt, Stranraer is in the west of the authority area. It is a relatively small site and accepts waste from the Wigtown area. This site will also require re-engineering should it be extended.

To address the problems it is facing in its waste management responsibilities for the future, the council is procuring a waste management and recycling project through the Private Finance Initiative (PFI), which is intended to run for 25 years.

The contract will deal with the treatment and disposal of all MSW collected by the council. It aims to meet the requirements of the EC Landfill Directive (99/31/EC). The project company will also be required to manage and operate the council's civic amenity recycling sites, recycling bank sites and to progressively restore all the council's active and inactive waste disposal sites.

Dumfries and Galloway Council is now in a position to put forward the project company's proposal for consideration as providing the BPEO for its area.

Tendering and BPEO

The PFI project was drawn up before the development of the Area Waste Plan. Its main criteria were:

- a need to satisfy domestic and European waste management legislation;
- a need to deliver value for money;
- a need to comply with regulation at waste facilities;
- a need to secure twenty-first century investment for twenty-first century legislation and regulation.

The requirements of the developing Area Waste Plan were introduced as the tendering process progressed. In particular, the need to fit specifically with the Area Waste Plan and the need to demonstrate BPEO for the waste streams being used in the chosen option were emphasised.

The process followed was a gradual focusing down through the stages of:

1. Invitations of expressions of interest through advertising in European and UK journals and press;
2. Issue of pre-qualification questionnaires (37 issued);
3. Return of pre-qualification questionnaires (nine received from major waste companies);
4. Shortlisting companies to receive invitation to negotiate (four companies);
5. Receipt of formal bids (three companies);
6. Evaluation of full bids and identification of Preferred Bidder and Reserve Bidder.

Dumfries and Galloway Council was also required to prepare a public sector comparator which represented the waste management option the council would have proceeded with had it had the appropriate funding available. This option was fully costed, primarily as a means of judging the value for money and cost benefits of the options put forward by the bidders.

Preferred Option

The preferred option divides Dumfries and Galloway into two areas. About 75% of the MSW will be taken to a centralised pre-treatment plant near Dumfries.

The proposed pre-treatment is the Eco-Deco system.

1. waste is shredded and fed into drying areas. Water is driven off by a forced air feed and natural heat generated from the initial stages of composting;
2. a residue of relatively cleaner and much drier waste is sorted for the removal of metals and glass for recycling (approx 19% of total);
3. The remainder of the material is then converted to a refuse-derived fuel (RDF) which can be used as feedstock in a suitable energy from waste plant.

Currently the preferred bidder is, without prejudice, negotiating with the independent BATNEEC Dumfries Ltd to take the material. BATNEEC Dumfries Ltd have outline planning permission for a pyrolysis or gasification plant just outside Dumfries. If this route does not become available then alternatives could be established. Such an approach does not preclude identifying future means of recovering or recycling the RDF material should technologies change.

The waste in the Galloway area (approx 25% of total MSW) will continue to go to landfill at Galdenoch, with pre-sorting for composting (approx 20% of that total) and recycling through bring facilities (approx 7% of total).

Determination of BPEO

To check that the preferred option fits with the area waste planning process, the council subjected all the bids, plus their public sector comparator, to the BPEO analysis using the options appraisal tool developed for this purpose by SEPA (details are in Section 1.3 of this consultation document).

The options appraisal exercise was undertaken by:

1. Officers of the council's PFI project team;
2. Representatives from the technical consultants employed by the council;
3. SEPA Officers.

Results of the analysis are attached below (see comparison table). This level of analysis came out in favour of Dumfries and Galloway Council's preferred option. A variant using a source-segregated collection of waste scored exceptionally high as well. It is proposed therefore to consult widely on whether this additional element should be developed to enhance the project.

Points to note about the exercise are that no weighting was attached to any of the national criteria, (i.e. they were all given the same relative importance). The overall rating is taken as an average of the scores given to each of the national criteria. The ratings for each of the criteria were all judged relative to landfill (i.e. the overall rating is an assessment of how much better the system is than relying solely on landfill).

Note: none of the national criteria is weighted, therefore the determination of the BPEO is not based solely on the environmental analysis.

Note: it is an integral part of the tender specification that all the proposals must meet the diversion targets.

Table 13 Dumfries and Galloway Option Appraisal Comparison Table

National Criteria	Option				
	1	2	3	4	5
Air, land and aquatic environment	c+	b+	b-	b	b+
Cultural heritage	c	c+	d	c-	c+
Global climate change	b	b+	b	b	b
Local amenity	d	c+	d-	c-	c
Natural heritage	b+	b+	d	b	b+
Non-renewable resource use	c+	b	b	c	a-
Accidental risks	d	c+	c	c	c
Overall costs - cost and operational costs	c	a	e	d	b
Financeability, affordability	c	a	d	c-	a
Impact on local economy	b-	b	b	b-	b+
Employment (all options are +)	b-	b-	b+	c	d+
Making producers responsible	c	c	b	d	b
Public acceptability	c-	c-	d	e+	b
Skills base	b+	b+	b-	b	b+
Social implications (poverty, exclusion and access)	b	b	b+	c-	b+
Flexibility	b-	b+	a	d	a-
Making the best use of existing facilities and expertise	c+	b-	c-	c+	b-
Practical deliverability	c-	b	e+	c	b-
Technical feasibility	d	c+	c	b+	c+
Compliance with other policies	c	c	c	d	b
Overall Rating	c+	b-	c	c	b

*Note: Scoring a-d (where 'a' is best and 'd' is worst)

Brief Description of Options	
Option 1	Energy from waste led (50%), serviced by dirty MRF and supported by composting (25%) and recycling (15%) with residual landfill outwith the area.
Option 2	Three quarters of waste supported by bio-pretreatment (60%) feeding energy from waste (50%) and recycling for metals and glass (8%) with residuals to landfill. One quarter supporting composting and landfill option.
Option 3	Primarily landfill. Three quarters source separated. Feeding clean MRF for composting and recycling (25%) with residuals at new landfill. One quarter same but recyclate transferred to Dumfries and residuals landfilled at existing site.
Option 4	Energy from waste led (90%) with minimum recycling and composting (10%). Ash disposal (30% of 90%) outwith area.
Option 5	Source segregated variant of option 2. 17% source segregated for composting and recycling.

WISARD Analysis

As well as the appraisal, SEPA used a computer programme called WISARD for its environmental analysis of the environmental impacts (see Section 1.3). Table 14 summarises the results. This indicates that the option with the least negative environmental impact is option 5 (a source segregated variant of the council's preferred bid, option 2). As stated above, it is proposed therefore to consult widely on whether this additional element should be developed to enhance the preferred option.

Table 14 below was designed as an aid to ranking Area Waste Plan options on environmental criteria using the outputs from the WISARD. This simply ranks the impacts on an equal basis. The first three impacts are those which should be taken into account by all Waste Strategy Area Groups as they are of national importance. The weighting factors for these cannot be changed. The remaining impacts are those which can be taken into account where a local group considers it necessary. The weighting factors on these can be changed.

When assessing the five options, each impact is scored with 1 the best and 5 the worst. The scores are entered in the table and the weighted results are automatically calculated. The options can then be ranked in order of environmental performance.

Table 14 Unweighed results

		Options				
		1	2	3	4	5
Environmental Impacts	Global warming	5	3	4	2	1
	Depletion of Non-Renewable Resources	5	3	4	1	1
	Ozone Depletion	5	3	4	2	1
	Acidification	5	3	4	2	1
	Eutrophication	5	3	4	2	1
	Human Toxicity	5	3	4	1	1
	Aquatic Toxity	5	3	4	1	2
	Terresterial Toxicity	5	2	3	4	1
	Total Score	40	23	31	15	9
	Ranking of Options	5	3	4	2	1

It must be noted that this matrix is simply a tool to assist in interpreting the results from WISARD. There is no scientific or statistical basis to the weightings, they are ranked subjectively on the basis of the relative accuracy of the impacts tools available, and/or the relative importance of the impact.

Costs

As Dumfries and Galloway Council is still involved in the bidding process it is not possible to provide a detailed costing comparison of the options presented. However the options are ranked in Table 13, under Overall Costs, option 2 (the council's preferred bid) being the least cost.

Additional Factors

The council is undertaking an extensive consultation process to determine the general acceptability of the waste treatment and disposal option. It will also gauge public opinion on introducing source-segregated waste collection and/or enhanced recycling facilities to boost recycling and composting figures. A doorstep survey of attitudes to waste, recycling etc is being commissioned. The council is committed to further expansion of its recycling banks and civic amenity facilities.

Importantly, the proposal is sized to cope with the 2010 projected waste figures at the upper growth rate of 2% (see SWMBA appendix 2).

There has been extensive media and press coverage of the PFI process. Five roadshows to explain the PFI project in Dumfries, Annan, Dalbeattie, Stranraer and Newton Stewart were well attended by the public.

Final Results - Proposed BPEO Implementation

Dumfries and Galloway Council has proposed option 2 as the preferred bid to form the BPEO for the Waste Strategy Area. A summary of the findings from all the elements of the foregoing analysis is given below in Table 15.

Table 15 Summary of Final Results

	Option 1	Option 2	Option 3	Option 4	Option 5
Diversion targets	Yes	Yes	Yes	Yes	Yes
Costs ranked from comparison table	c	a	e	d	b
WISARD impacts	5	3	4	2	1
Options appraisal	c+	b-	c	c	b

As can be seen, the preferred option is chosen on balance, primarily for its lower costs. Further consultation is being undertaken on extending the preferred bid to include source-segregated collection of materials as a means of enhancing the project (as per option 5).

5 Draft Area Waste Plan

This section takes all the findings of the previous sections and fits them into a Draft Area Waste Plan. A set format has been followed to fit with the structure for an integrated national waste plan. All the elements specifically related to the Ayrshire, Dumfries and Galloway Waste Strategy Area are taken from the findings of the group, as set out in the Strategic Waste Management Baseline Assessment and previous sections of this document.

5.1 Draft Area Waste Plan

Introduction

Waste management in Scotland is facing a period of rapid and radical change. Driven by European legislation, the need for improved environmental protection and public expectation, we must find ways of reducing our current dependence on landfill and moving towards more sustainable methods of managing waste. We must also seek to reduce the growth in waste arisings, minimise resource use, reduce the hazardous content of waste and to find solutions that do not compromise the future – in line with sustainable development. This will require a fundamental change in our current attitude to waste and an acceptance that we all have a responsibility to reduce waste and not simply to pass the responsibility to others.

The advent of the Landfill Directive, which deals with the re-classification of landfill sites, stricter control of how they are engineered and what is permitted to be placed in them, is the main driver for change. This will result in lessening the impact of waste generation by requiring more value recovery from waste through recycling, composting and, in the longer term, recovery of the energy from wastes.

Membership of the Waste Strategy Area Group is principally from the public sector. This is due, mainly, to the local authorities' responsibilities for producing individual recycling plans and their legislative requirements as dictated by the Landfill Directive.

As development of the plan evolves, through the inclusion of options for other waste streams, the membership may change, to reflect the needs of industry and commerce.

It is important that the final Area Waste Plan adopts an integrated approach which:

- Ensures that all waste streams are considered together and the solutions chosen for individual waste streams are considered in the light of how they impact on the management of others;
- Considers waste minimisation, re-use, recycling, energy recovery, disposal, promotion and education and local market development in a coherent and planned way;
- Ensures consistency with adjoining areas and national integration of the plan within the National Waste Strategy: Scotland; and
- Where there are proposals for the export of large volumes of waste from the Waste Strategy Area, these proposals are examined as to their compliance with the BPEO.

To date the focus of the Area Waste Plan has been on the wastes that are currently handled by the local authorities. This represents some 25% of all the wastes generated in the area (estimated from the SWMBA). This waste has a high pollution potential due to its biodegradable content (estimated at 60% in line with EC Landfill Directive guidance).

It should be noted that other non-MSW waste streams have not been considered to the same degree of detail, due to lack of available data. Other wastes are dealt with in Section 3 and include special waste, tyres, batteries, packaging waste and others. A number of these wastes will be the subject of Priority Waste Stream Projects (see Section 3) and the findings of these will inform the future development of the plan.

It will be important to establish the composition and quantity of the other waste streams within the area. This will be the subject of ongoing work during the next phases of the Area Waste Plan development and implementation in the Ayrshire, Dumfries and Galloway area. As with household waste, determining accurate waste data and growth rates for these other waste streams is vitally important.

Top of the waste hierarchy is waste minimisation and the need to change our means of production so as not to produce as much waste. All the authorities have recognised the importance of this and have implicitly included the need to develop waste minimisation strategies to support their application of the BPEO within their authority. Priority will need to be given to devising methodologies to assist in developing and rolling out such strategies for all wastes.

The Scottish Waste Awareness Group (SWAG) is undertaking research projects to determine public attitudes to the waste they generate in the home. In particular, part of this work will be undertaken in Dumfries and Galloway, where it is hoped the results will help to inform the final shape of the Council's waste management PFI project.

Raising awareness of the importance of this issue, particularly in commerce and industry, will be an ongoing programme and is supported by SEPA's national programme for the development of waste minimisation initiatives. Actions to stimulate participation in waste reduction and recycling are needed and will be sought.

ACTION 1:
Each local authority to ensure that, as their waste management contract is due for renewal, the chosen options conform to the requirements of the Area Waste Plan.

ACTION 2:
To more clearly define the quantities and nature of wastes in the area, other than MSW, to enable the integration of facilities for treatment, where appropriate.

ACTION 3:
a) The need to develop a suitable Waste Stategy Area Group structure to roll out waste minimisation strategies, primarily covering MSW and the local authorities' statutory duties to deal with their wastes.

b) The need for SEPA, through the area waste planning process, to develop suitable structures to roll out waste minimisation strategies, covering internal waste reduction and commercial and industrial waste minimisation.

Partnership Working

To date, the WSAG has formed the focus for developing the Area Waste Plan. This group is a partnership between the four unitary authorities, SEPA and the relevant Scottish Enterprise companies. The role of the Scottish Enterprise companies has been limited by the focus on local authority responsibility for MSW. The principal drivers are the local authorities' statutory responsibility to deal with household waste, plus their need to comply with the EC landfill Directive. Given these factors and the lack of good quality data for industrial and commercial sources of waste, the work of the group has focused on MSW. It is essential that this group continues to meet in some format, to monitor and ensure the successful implementation of this first MSW-led phase of the plan. The partners continued participation will be needed in the next phases, leading to the development of a final plan will be needed. The importance of the participation of the elected members in the process cannot be overemphasised.

The actual format and role of the group in the next stages may vary, to account for the task specifically being undertaken. This will be very much determined by how the next phases of the plan will be rolled out. In particular, it must be recognised that, despite the laudable efforts of local authorities and the private waste industry, little can be achieved in isolation.

ACTION 4:
To identify the next elements of the Area Waste Plan and set up aims and objective led groups to specifically target their delivery.

Key Aim and Objectives

Key Aim

To contribute to the sustainable development of the Ayrshire, Dumfries and Galloway Waste Strategy Area by developing waste management systems that will control waste generation, reduce the environmental impacts of waste production, improve resource efficiency, stimulate investment and maximise the economic opportunities arising from waste.

Objectives

1. Set out in detail the existing waste management infrastructure and arrangements, develop the principles and plan for progress in waste management in the medium and long terms to meet current and future legislative requirements and the objectives of the National Waste Strategy: Scotland.
2. Ensure that the waste management system developed is in accordance with the principles of sustainable development and integrated waste management, and makes the maximum possible contribution to reducing society's environmental impact at an acceptable cost.
3. Provide a clear framework for stakeholders to judge the future development of waste management services in the Ayrshire, Dumfries and Galloway area, and to guide both local authority Integrated Waste Management Plans and private investment decisions.
4. To ensure that development planning policy is consistent with, and contributes to, the overall aims of the National Waste Strategy and the Ayrshire, Dumfries and Galloway Area Waste Plan.
5. To maximise the opportunities for Ayrshire Dumfries and Galloway businesses arising from sustainable waste management, including the not-for-profit sector.
6. Ensure that the Area Waste Planning process offers a clear, transparent and informative approach that is demonstrable to local stakeholders.

Context

In putting this in context, please remember that this phase of the draft plan has been forced to focus primarily on MSW and the local authorities statutory duty to deal with household waste.

The Waste Strategy Area is composed of four local authority areas. The area essentially covers the South West of Scotland and supports a population of 522,700 (at 1998). Table 16 (below) shows the estimated population figures by administrative area for 1998 and population projections until 2020. Table 17 gives the estimated and projected households (by administrative area) for 1998 for the same period. It should be noted that both the population and household projections use General Records Office (Scotland) (GRO(S)) data projected to 2016 and 2012 respectively and extrapolated to 2020 for indicative purposes only. Given the original data is based on the 1991 census there is the potential for a considerable margin of error in the plan period.

Table 16 Projected Population to 2020 for the Four Administrative Areas

	1998	2005	2010	2016	2020	%change 1998 -2020	%change per year
Dumfries and Galloway	147,300	145,600	143,800	141,300	139,900	-5.0	-0.2
East Ayrshire	121,300	117,100	113,700	109,300	106,700	-12.0	-0.5
North Ayrshire	139,600	139,700	139,600	139,200	139,100	-0.4	-0.0
South Ayrshire	114,400	114,600	115,200	116,100	116,500	1.8	0.1
Totals for WSA 9	522,700	517,000	512,300	506,000	502200	-3.9	-0.2

Source: Population Projections Scotland (1998 based) published 2000

Note: No national projections beyond 2016. 2020 figure extrapolated using 1998 -2016 trend.
Percentage change per annum calculated over total period range: Mid 1998 - Mid 2020 = 18 years.
All figures rounded to nearest hundred.Percentage change shown rounded to one decimal place.
See reference data sheets Appendixes 2 & 3 for full details of calculations.

With the exception of South Ayrshire, the estimated populations served by the authorities within the area are in decline. East Ayrshire's current rate of reduction is the most extreme. When this percentage change is projected forward, it weighs both the calculated annual percentage change for the local authority and the whole area. This has a knock-on effect on the projected tonnages of waste arising (see SWMBA Appendices 2 and 3). The declining population figures also mask a changing demographic profile (changing age structure, projected rise in single person households etc.) These changes are, for example, likely to give rise to a substantial rise in household formation despite the projected population loss. As a consequence the changing demographic context could have an effect on waste production, though without further research this is not possible to quantify. Current evidence, however, suggests that a reduction in household waste arisings is achievable over the period of the plan.

Table 17 Projected Households to 2020 for the Four Administrative Areas

Area	1998	2005	2010	2012	2016	2020	%change 1998-2020
Dumfries and Galloway	63,000	65,700	67,300	67,900	69,000	71,000	+12.7
East Ayrshire	50,700	51,800	52,700	52,800	53,000	54,000	+6.5
North Ayrshire	58,500	62,400	65,300	66,400	69,000	71,000	+21.4
South Ayrshire	48,200	50,600	52,400	53,200	55,000	56,000	+16.2
Totals for Area	220,400	230,500	237,700	240,300	246,000	252,000	+14.3

Source: Household Projections Scotland (1998 Based) published 2000.

Note: There are no national projections beyond 2012.
The figures of 2016 and 2020 have been extrapolated using the 1998 -2012 trend to the nearest thousand.

Estimates can be made for the projected tonnage of household waste if it is assumed that it equals MSW and that waste production is directly proportional to population change (see Table 18 below).

Table 18 Projected Household Waste Change 2000-2020 If Directly Proportional to Population Change

Year	1995	1998	2005	2010	2020
Population		522,700			
Projected Population			516,974	512,157	502,239
Tonnage of Waste	310,062				
Projected Tonnage of Waste		308,483	304,831	302,249	297,150

Population data taken from Table 5 (Section 2.1 Population and Households).

Waste tonnage projections taken from Appendix 3.

Note: Appendix 1 Summary table 1998 figure for Total local authority waste arisings: 225,788 tonnes.

Industrial Waste (Other than Construction and Demolition)

It is estimated that in 1998 some 138,000 tonnes of industrial waste were generated in the area (see summary of arisings and disposals). This excludes sewage sludge and construction and demolition waste. Approximately two thirds of this waste, 96,000 tonnes, was landfilled within the area. Of the remaining third, roughly 58,000 tonnes was exported for recycling. A relatively small amount, approximately 7,000 tonnes, was imported for recycling which led to a total of 14,000 tonnes being recycled in the area.

These estimates are based on figures provided by the councils and private contractors and collected by Enviros Aspinwall. Although the summary table balances this section, there is not enough reliable data to estimate growth rates for the industrial wastes in the area.

Sewage Sludge

It is estimated that in 1998, some 400,000 tonnes (wet weight) of sewage sludge were produced in the area. These figures are based on estimates provided by the councils, private contractors and the former West of Scotland Water. It is recognised that these figures may be inaccurate, due to variations in private figures supplied. However, 400,000 tonnes is likely to be the maximum tonnage of sewage sludge arising.

Arisings of sewage sludge are likely to change in the near future. Projected change is less likely to be affected by the population changes than requirements of the Urban Waste Water Directive. This will require much higher discharge standards, which could lead to an increase in sludge production from those treatment works discharging to water. Additional treatment facilities are planned to further process the sludge.

Construction and Demolition Waste

It is estimated that in 1998, 400,000 tonnes of construction and demolition waste were collected in the area. Most of this waste was landfilled in the area. Roughly 172,000 tonnes were collected for recycling purposes. Allowing for the balance of imported and exported waste, there are 172,000 tonnes entering the system that have not been accounted for unless the data has not included the recycling data in the arisings total. This serves to highlight the problems encountered in gaining reliable waste data, and why the group had to focus on MSW.

Special Waste

Only very poor quality data is available on the arisings of special waste in the area, although there are a number of sites licensed to accept special waste (predominately bonded asbestos). Basically, 8,000 tonnes arose in the area, of which 4,500 tonnes were exported and 3,500 tonnes disposed of internally. From 1997 to 1999, the local SEPA offices issued a small number of special waste notes. The majority of these notes were issued for the disposal of small quantities of asbestos from construction and demolition works.

The main producers of clinical waste in the area are the Ayrshire Health Board and the Dumfries and Galloway Health Board. During 1998, this material was transported within the area to the Crosshouse Incinerator, at Kilmarnock.

Agricultural Waste

As agricultural waste is not a controlled waste, there is no obligation on farmers to record the quantity of waste that they produce. As a result, there are no accurate figures available on the tonnage of waste generated. The waste minimisation initiative underway in the area should give an indication of waste arisings from selected farms, which could be used to gain an estimate of the total agricultural waste arisings for the area.

Summary of Waste Arisings and Disposals

The table below gives an indication of the waste arisings and movements of waste in the area.

Figure 9 Waste Arisings in Ayrshire, Dumfries and Galloway

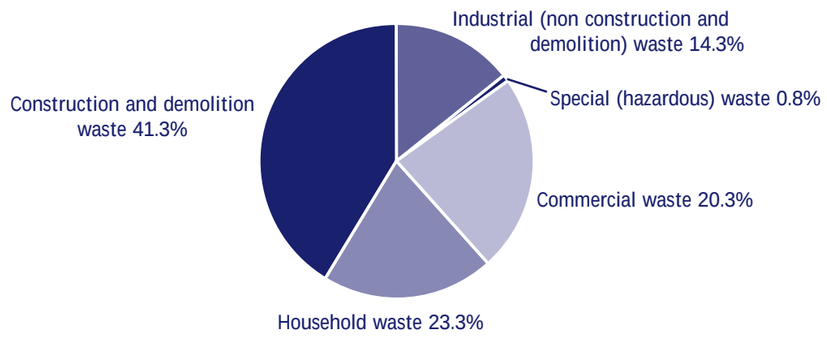
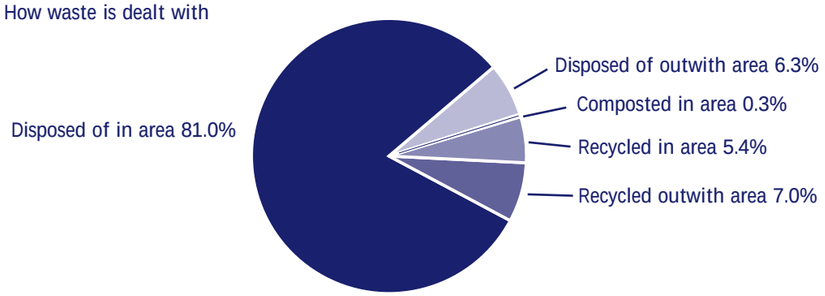


Figure 10 How waste is dealt with



Implementing an Integrated Plan (Including Managing Non municipal Solid Waste (MSW))

It is important that the Area Waste Plan adopts an integrated approach which:

- Ensures that all waste streams are considered together and the solutions chosen for individual waste streams are considered in the light of how they impact on the management of others;
- Considers waste minimisation, re-use, recycling, energy recovery, disposal, promotion and education and local market development in a coherent and planned way; and
- Ensures consistency with adjoining areas and national integration of the plan within the National Waste Strategy: Scotland.

Regional waste management across the area has to be taken into account in seeking an integrated approach. Details for the four authorities are given below.

Dumfries and Galloway

The local authority has seven licensed landfill sites of which three are operational in terms of accepting MSW (the other four are licenced and in post closure and restoration stage, taking inert waste only by appointment). This gives a theoretical handling capacity of 200,000 tonnes per annum but only up to 150,000 tonnes per annum is currently being used. It is the council's intention to close and restore the main site in the east of the authority area (Locharmoss) as soon as practicably possible. Aucheninnes, near Dalbeattie will require re-engineering to meet containment requirements of the licence should it be extended to become the authority's main site. The third active site at Galdenoch, Leswalt, Stranraer is in the west of the authority area. It is a relatively small site and accepts waste from the Wigtown area. This site will also require re-engineering should it be extended.

There are nineteen private sites currently on the register. The majority of them are either closed or closing, or only offer a small-scale part-time facility for inert waste. Effectively, Phase II of Auchenlosh, with an annual licence capacity of 25,000 tonnes per annum, is the only commercially operating site in these parts.

On the recovery side, there are eight licensed facilities. Seven of these are scrap metal recyclers and one, (R.Frazier Ltd, of Dumfries) operates a major recovery and recycling operation for computer equipment and telephones.

There are three accredited (in terms of the Producer Responsibility Obligations for Packaging Waste) reprocessors, namely Armstrongs Waste Management with accreditations for wood and paper, Dumfries Plastics Ltd and Plastic Technology Services Limited, dealing with plastics.

East Ayrshire

The local authority does not operate any sites. There are currently six licensed facilities, all private. Three are small part-time operations. The other three provide the major part of the area's capacity for dealing with active waste. Together they provide a waste handling capability of approximately 2,500 tonnes per day and a disposal capacity of about 50,000 cubic metres per annum in the local authority area.

It should be noted that Craignaught operates a significant composting process and that Garlaff Landfill Site is commissioning a landfill gas energy recovery plant.

The clinical waste incinerator at Crosshouse, which used to take all the Health Board waste for the area, does not meet requirements to burn special waste. Its operation, therefore, is limited to clinical waste that does not fall into this category, or is hazardous only by means of the infectious nature of the material.

The only licensed recovery facilities are two metal and scrap metal dealers.

North Ayrshire

North Ayrshire has a tradition of self-sufficiency in their waste management arrangements. Currently, waste disposal is carried out at a landfill site at Brodick, serving the Isle of Arran and a landfill site at Shewalton, Irvine serving the mainland and the island of Cumbrae. As detailed in the SWMBA, the landfill site at Shewalton is intended to operate until August 2004, subject to satisfactory outcome of discussions with SEPA. Thereafter, it is proposed to use another area of Shewalton for which planning permission is already in place, which should facilitate another eight to ten years of landfill (allowing for EEC landfill diversion requirements). This latter site will be a fully contained site and will require an IPPC application to SEPA. Consultants have already been tasked with obtaining the necessary information to facilitate such an operation. North Ayrshire Council have recently gained planning permission for a major site at Bogside near Irvine, which would meet the long-term disposal needs for mainly inert waste.

Privately, there are five licensed facilities with a total licensed waste handling capability of 104,000 tonnes per annum in the local authority area (a capacity of almost 3 million cubic metres).

There are no licensed recovery facilities operating in the area. It should be noted that there is one accredited reprocessor (in terms of the Producer Responsibility Packaging Waste Regulations), namely Rockware Glass.

North Ayrshire also has a new clinical waste incineration facility. This facility, operated by Hamilton Clinical Waste Ltd, has an operational capacity of 25 tonnes per day. This equates to a capability of approximately 9,000 tonnes of clinical waste per year. At Meadowhead, near Irvine, there is a proposed sludge drying pyrolysis and gasification plant with a proposed daily throughput of 1,000 tonnes of sludge per day (around 360,000 tonnes per annum). In addition this facility proposes to take sludge from Stevenston and Inverclyde Waste Water Treatment Works.

South Ayrshire

The local authority does not operate any landfill sites of its own, although it does operate one licensed waste transfer station and six licensed civic amenity sites within their area. South Ayrshire Council disposes of the majority of its municipal wastes at Garlaff Landfill site near Cumnock, through a 15-year contract agreement with Barr Environmental of Heathfield, Ayr. Wastes arising in the south of the district are currently disposed of at Straid Landfill site, Lendalfoot

The council's civic amenity sites have separate skips and containers for the deposit of garden waste, wood, metals, glass, paper, cardboard, textiles, oil, etc. which are all passed on for recycling. In addition, the council provides a number of glass and can recycling banks strategically located throughout the district. The council has also introduced an extensive waste minimisation project involving the distribution and promotion of home composting bins to householders within the district.

There are currently two private licensed landfill sites within South Ayrshire, at Tarbolton Moss and at Straid Farm, Lendalfoot. There is one licensed metal recovery facility at Ayr Harbour and one licensed waste transfer station at Saltpans Road in Ayr.

Civic Amenity and Recycling Facilities

All the local authorities are committed to providing a civic amenity network to serve the needs of their individual communities. Likewise, all of the authorities are committed to innovating and trialling different recovery, recycling and composting operations.

Waste Collection Systems

All the local authorities operate a mixed household and commercial waste collection service and have standardised their collection systems on wheelie bins. (Garden refuse collection, special lifts etc have not been standardised.) This traditionally provides the most cost effective means of quickly and safely gathering large quantities of waste without the labour intensive requirements of sack or manual bin systems. A few such systems are retained in special localised circumstances.

Full details of the methods and costs of operating these services are found in the Audit Commission's report on value for money in local authority waste collection system services, entitled Benchmarking Refuse Collection published in April 2000.

The costs shown in Table 19 below are taken from that report. They include an element of commercial collection undertaken by the local authorities, but still give an insight to the extremely cost effective nature of their current operations.

Table 19 Annual Gross Cost of Mainstream Refuse Collection per Property Served

Local Authority	Gross Cost Per Property Served
Dumfries and Galloway Council	£37 p.a.
East Ayrshire Council	£37 p.a.
North Ayrshire Council	£32 p.a.
South Ayrshire Council	£34 p.a.

Waste Movements

Of approximately one million tonnes of waste arisings within the area, the vast majority, some 863,000 tonnes, are disposed of within the area. Only a relatively small amount is exported outwith the area and that tends to be for recycling. Consequently, the exports accounted for are directed to the central belt. The figures disguise the fact that a certain amount of waste does move around within the area boundaries, particularly given the interplay of contracts and disposal facilities in Ayrshire. It is also worth noting that the movement of waste is exclusively by road.

Slightly more than half of the special wastes that we can account for being produced in the area are exported to licensed facilities outwith the area. Scotland produces over 200,000 tonnes of special waste. More than half of this is known to be transported to England for treatment, recovery or disposal but we have no specific data relating to this. Given the major transit corridor of the M74 and M6 one would expect to see the bulk of the transported special waste going to England, transiting through the area.

Landfill Directive

The Landfill Directive is one of the key drivers behind the National Waste Strategy: Scotland. The Directive imposes minimum environmental and engineering standards for landfills across Europe and will ban the landfilling of many substances that are disposed of in this way at present. It also requires the pre-treatment of wastes before landfilling, to both reduce waste volume and minimise the environmental impact of disposal. The Directive also requires a progressive reduction in the landfilling of biodegradable municipal solid waste (BMW), which decomposes and produces pollutants when landfilled.

Although the targets have been given dates, some member states that are particularly dependent on landfill will be allowed to delay the dates by up to four years. It is expected that the UK will take advantage of this. The UK has to report to the European Commission by 16 July 2003 giving details of how the targets will be met and a decision on whether to extend the target dates will be taken then.

From a baseline of 1995, the amount of BMW permitted to be landfilled will be (depending on whether the four year delay is used):

- 75% of 1995 levels by 2006 or 2010;
- 50% of 1995 levels by 2009 or 2013;
- 35% of 1995 levels by 2016 or 2020.

Current evidence points to 2% growth rate in household waste arisings. This implies a 12,000 tonnes per annum reduction, averaged over the 20-year period of the plan, as being required to meet the 2020 Landfill Directive target for the area as a whole. This would further seem to indicate the interplay of a number of influencing factors in determining waste growth, rather than any single determining factor, such as those the projections are based on. The EU Landfill Directive will be translated into UK legislation during 2000-2001. This will be the single most influential driver to bring about significant changes to our current waste management regime. The derivation of the figures detailed below is based on the assumptions that 60% of MSW is biodegradable and that the four-year delay is taken up by Scotland. This group has consistently adopted a minimum and maximum range approach, to compensate for variations in the quality of waste data. The minimum range is expressed as 0% innate waste growth coupled to population change applied to the 1995 figure. The MSW growth rate to 2016 is unknown, however, past trends suggest 2% growth. Consequently a 2% innate growth is used to identify the possible maximum range (all from SWMBA). The diversion required and the breakdown of municipal waste is detailed in Table 20 below.

Table 20 Projected BMW Diversion Requirements

Maximum projection at 2% innate waste growth					
Year	1995	2010	2013	2020	
Total MSW	310,100	417,300	442,800	508,690	
Total BMW	186,000	250,400	265,700	305,214	
Diversion		110,900	172,700	240,100	(max projection)
Minimum Projection at 0% waste growth plus population change					
Year	1995	2010	2013	2020	
Total MSW	310,100	301,800	300,200	296,400	
Total BMW	186,000	181,100	180,100	177,800	
Diversion		41,549	87,100	112,700	(min projection)

Data from SWMBA Appendixes 2 & 3 (rounded to nearest hundred tonnes).

The group proposed the flexible option as the means of delivering the BPEO for the Waste Strategy Area. It is this option that is being consulted on. Basically the flexible option is designed to pick off the best elements of all the options identified earlier in this consultation document. Thereafter it is applied in an appropriate format to meet the specific local authority needs. In particular the option seeks to bridge the areas of uncertainty, i.e, the high-risk elements and the delivery gap that most of the other options display in trying to reach the later diversion targets. In generic terms it allows:

- composting to be pursued at a level the local authorities can support and find internal markets for, without necessarily utilising the ethically questionable in vessel MSW composting methodology;
- recycling and/or recovery for re-use to be pursued in a flexible manner that can adapt and respond to changes in both the market and the development of Scotland's infrastructure;
- the delivery of the later diversion targets through the adoption of small-scale modular and flexible technologies (such as pyrolysis, gasification or anaerobic digestion) that don't minimise and or undermine the development of composting and or recycling.

In modelling for the technical yields, this option was found to be hugely responsive. It could deliver the targets using a diverse range of different proportions of materials going to the different elements. It could use a wide range of different technologies and systems. It further performed well under a wide range of adverse scenarios.

A further bonus is that the option allows maximum flexibility to each of the local authorities in their practical application to meet their needs. As pointed out (SWMBA and Section 1) the local authorities are operating under different contract periods, utilising different structures and systems. This approach lends itself to being introduced on a modular basis (if appropriate). If introduced on a modular basis, it also has potential for systems to be linked or shared at later stages in the process, as technologies, markets and/or circumstances change.

A final point in the flexible option's favour is that it allows forward contingency planning. Should the most favourable conditions be achieved under which a mix of composting and recycling can deliver the diversion targets, then the introduction of an additional technology later may not be necessary. This issue really becomes one of risk management for the individual local authorities in delivering their statutory responsibilities for managing household waste.

Landfill Permits

The landfilling of BMW will in future be controlled through a system of landfill permits. However, this is still under discussion. These permits are expected to be tradable which would allow local authorities in areas where the additional costs of diversion away from landfill are high, to landfill waste by buying permits from other local authorities. It should be noted that commercial waste outwith local authority collection is not within the scope of this aspect of the Directive. It is the responsibility of each local authority within the Waste Strategy Area Group to decide how to use the permits allocated to them by the Scottish Executive.

Landfill Tax

Landfill Tax was introduced in 1996 as a fiscal measure to divert waste from landfill. It has a considerably reduced the quantities of inert material being disposed of in landfill sites, by diverting this waste to sites with exemption from Waste Management Licensing.

The current level of tax is £13 per tonne for active wastes and £2 per tonne for inert wastes. The tax will be increased by £1 per tonne, for active waste until 2004. There is no intention to raise the level for inert waste. It is widely accepted, that after this date, there is a need to substantially increase the level of the tax. A Parliamentary Sub Group has recommended, that it be raised by £5 per annum, until it reaches £35 per tonne. This would lead to parity between landfill and other waste treatment techniques, which would encourage more recycling and recovery of wastes.

The Landfill Tax Credit Scheme returns some of the revenue from Landfill Tax to the community to establish environmental projects. There is an emphasis on directing the majority of this funding to projects which will stimulate recycling, known as Category C Projects. At present 20% of the tax collected by landfill operators is available. The recommended increase in Landfill Tax would provide considerably higher funding from this source. Obviously the value of Landfill Tax credits will be affected by the level of tax and the residual quantities of waste being disposed of to landfill. It should also be noted that the scheme is currently under review.

Waste Minimisation

The need to prevent and reduce the amount of waste being produced has never been stronger and waste minimisation therefore forms a key element of the National Waste Strategy: Scotland. Waste minimisation tools include pre-product design, changes to management and production processes and the development of clean or wasteless technologies.

Waste minimisation initiatives must address two distinct waste steams:

- household waste; and
- commercial and industrial waste.

The main impacts to be gained in the MSW stream through waste minimisation are through dealing with packaging waste. Individual awareness of the environmental and economic impacts of excessive packaging needs to be raised. Suitable purchasing by individuals can help, however, excessive packaging should be reported to the Trading Standards Office of the local authority, who have a responsibility to pursue this matter.

Whilst home composting is not strictly speaking waste minimisation, it does prevent biodegradable material from entering the collection system. As the biodegradable fraction of household waste is in the order of 60%, there is clearly considerable benefit to be derived from dealing with this fraction of the waste at source.

The National Waste Strategy sets a target for the reduction of municipal waste arisings (household and commercial wastes collected by, or on behalf of, local authorities) by 1% per annum. At 1998 levels, assuming a zero rate of innate waste growth, this would equate to a decrease of approximately 3,000 tonnes per annum. This would not be offset by the declining population figures (averaging -0.17% per annum across the area over the period mid 1998 to mid 2020). Further, as pointed out, if the innate change in waste production is more strongly influenced by the number of households, than the population changes, the anticipated rise in household numbers, averaging 14% across the area for the period of the plan, could amplify the required tonnage reduction proportionately.

It is expected that there will be more focused attempts to promote waste minimisation within the Waste Strategy Area. Current activities include the Ayrshire Textiles Project which identified returns of £538,000 across the 11 companies taking part in the project (representing a 1% return on turnover).

An Isle of Arran Waste Minimisation Project, which hopes to integrate with the sustainable waste management issues being debated, is being launched.

Dumfries and Galloway has a Waste Minimisation Forum, facilitated by SEPA and which is operating four waste minimisation projects. These include the Esk Water Project; based on industry around Langholm. The main interest of this project is to demonstrate a reduction in the toxicity of the water quality directly below the town's sewage treatment plant outfall.

Projects currently being drawn up include:

- An agricultural based project. This focuses on the Kirtle catchment and hopefully will yield insights into agricultural waste generation that can be extrapolated across the area.
- A food manufacturing project. Food manufacturing is a significant local industry, which generates 7% of GDP in Dumfries and Galloway and employs 2,800 people.
- A High Street retail project. Located at Castle Douglas, this hopes to engage the entire High Street and yield suitable returns and lessons that can be applied in similar towns in the rest of the area.
- South Ayrshire Council has embarked on an extensive home composting project and has now introduced over 10,000 new home compost bins to householders. The council is also working closely with several partner organisations, such as the West of Scotland Agricultural College at Auchincruive, on waste minimisation projects.
- Girvan Sustainable Community is another initiative, that has been developed, and a Girvan waste minimisation group operates within this project.
- The Energy Efficiency Advice Centre in Ayr provides information and assistance to the public on all forms of energy use. The Centre has organised training courses for businesses on energy efficiency and waste minimisation. The Centre has contacted 5,728 businesses in the last year and trained 150 businesses on waste minimisation techniques. Over 50 employees in the leisure industry have been trained on waste minimisation, as have 50 domestic carers. This is the first energy agency of its type in mainland Scotland and European revenue funding has assisted greatly with its introduction.
- Visit Scotland organised an environmental award scheme for businesses in South Ayrshire and other award schemes such as Vision in Business and the Environment also contributed to waste minimisation in the district.
- The three Ayrshire Councils have also formed the Ayrshire Waste Management Advisory Group, which involves officers of the councils meeting at regular intervals to discuss and implement a range of waste management initiatives.

Re-use and Refurbishment

Traditional re-use and refurbishment activity has declined in recent years as the cost of replacing consumer durables has fallen in relation to the cost of repair. However, as well as removing items from the waste stream, re-use and refurbishment are linked to job creation and economic improvement and there remain opportunities for stimulating activity at a local level.

Re-use and refurbishment can operate at a variety of scales, from local jumble sales and car boot sales up to national organisations such as Oxfam and other charity shops. There are many initiatives within the Waste Strategy Area for the re-use of household goods. However, these could be developed and co-ordinated to enhance their effectiveness.

As well as waste management industry players, local community recyclers have an important role in developing re-use and refurbishment projects. The Recycling Advisory Group Scotland (RAGS), in acknowledging the importance of the community recycling sector, is working to establish a community recycling network in Scotland. This network will offer support and practical advice to community recyclers spreading best practice and experience.

ACTION 5:
Waste Strategy Area Group to develop re-use programmes and events targeting stakeholder involvement for specific objectives.

Recycling and Composting

Recycling is the separation of a material for processing, followed by preparation and sale onto a market to replace an existing virgin material. As such there are often numerous environmental benefits, such as reduced air emissions, reduced impacts of extraction, energy savings, lower disposal impacts and more efficient use of raw materials. There are often other benefits such as encouraging producers to take responsibility for their wastes and economic benefits such as improved competitiveness or greater employment opportunities.

Composting is the aerobic decomposition of organic material to produce a stable material containing organic matter and plant nutrients. There are often benefits in applying this material to land, including nutrient addition, improved soil structure and improved water retention.

At this stage only a generic BPEO has been proposed. Until such time as each of the local authorities identifies how it intends to implement that BPEO we can only repeat the generic observations made in Part 2, namely; that composting and recycling led options will only deliver the later diversion targets under the most favourable circumstances of low waste growth and maximum participation and materials yielded. As stated previously, the model assumes the availability of markets for the materials and that the materials will be taken up by that market. This ignores possible quality issues regarding the suitability of the materials recovered for recycling and or composting (as well as the current changing legislative and environmental enforcement regime for these materials). More importantly it ignores Scotland's lack of a recycling infrastructure. A key strand of the National Waste Strategy is to develop both the infrastructure and sustainable markets for recyclates. A strategy that pursues the early delivery of these materials without a mechanism linking their delivery to the development of the markets etc. runs the risk of creating a glut of materials and possibly destabilising the emerging markets and facilities.

From the technical yields models run so far, it would appear theoretically possible to achieve a combined composting recycling rate of between 30% and 40% across the whole Waste Strategy Area. Actual delivery will be very much dependant on the systems chosen by the local authorities to implement the generic BPEO.

Initial indications are that some forms of source-segregated collection are likely to be rolled out in the Waste Strategy Area.

ACTION 6:
Waste Strategy Area Group to develop recycling and composting programmes and events targeting stakeholder involvement for specific objectives.

ACTION 7:
Waste Strategy Area Group to monitor the Area Waste Plan implementation in achieving the composting and recycling targets identified to meet landfill diversion targets.

ACTION 8:
Waste Strategy Area Group required to investigate availability of reprocessors, markets and end users for recycled and composted materials within the Waste Strategy Area.

ACTION 9:
Waste Strategy Area Group members to examine existing standards and specification for materials to enable, where appropriate, local recyclate and compost to be used locally.

Energy Recovery

Energy recovery involves recovering part of the energy value from waste, either by burning or thermally treating the waste directly (e.g. incineration) or by burning a fuel produced by the waste (e.g. refuse derived fuel or landfill gas). The energy conversion efficiency of the plant will depend on the specific design, e.g. recovery of energy through combined heat and power (CHP).

For historic reasons, mass burn incineration plants have a poor reputation in the UK. They also tend to need expensive pollution control equipment to meet modern air emission standards and, if large-scale plants are built as the only or main technology for waste treatment, may result in a mixed waste treatment system that lacks flexibility to include other type of waste recovery.

The future of energy from waste may lie with emerging technologies such as pyrolysis or gasification. These have been proven in a range of applications such as coal gasification, tyre processing or biofuels, but are not proven in the UK for the treatment of a mixed household and commercial waste stream. Such technologies may also require careful waste pre-treatment.

It is clearly unacceptable to merely move from a regime of landfilling the majority of waste to one that advocates total thermal treatment in any of its forms. Such an approach has been rejected in the BPEO analysis (see Part 2) The flexible option proposed recognises that some from of energy recovery, either via anaerobic or thermal systems, will be needed to bridge the high risk gap to deliver the higher landfill diversion targets.

In terms of what may be subject to such processes, consideration must be given to the nature of the materials going to the process. Some fractions of the waste stream are non-renewable resources, for example plastics and, arguably, some of the paper waste. In the long term we will need to be able to re-use or recycle these. Aluminium and ferrous wastes will not enhance the thermal performance of a plant and should be recovered prior to processing. Whilst a limit has not been set on tonnage of waste that can be thermally treated, adherence to a recycling and composting emphasis leading to 2010 will be a limiting factor on the quantities available to thermal treatment processes.

It is envisaged that, long term, thermal treatment for recovering the energy value of the waste will be for the fraction of the waste that is renewable.

Waste Collection and Disposal

The disposal and operational details for each of the local authorities have been covered in the section headed Implementation of an Integrated Plan (see page 49)

All the local authorities operate a mixed household and commercial waste collection service. All the authorities have standardised their collection systems on wheelie bins. (Garden refuse collection, special lifts etc have not been standardised.) This traditionally provides the most cost effective means of quickly and safely gathering large quantities of waste without the labour intensive requirements of sack or manual bin systems. A few such systems are retained in special localised circumstances.

Full details of the methods and costs of operating these services are best found in the Audit Commission's report on value for money in local authority waste collection system services, entitled Benchmarking Refuse Collection published in April 2000.

The costs shown in Table 19, page 51 are taken from that report. They include an element of commercial collection undertaken by the local authorities, but still give an insight to the extremely cost effective nature of their current operations.

Future arrangements will not change significantly, in terms of the types of vehicle used for mainstream waste collection. However, the number of refuse collection vehicles dedicated to kerbside collections may substantially increase, depending on frequency of uplifts from householders. And what type, if appropriate, of segregated collection is used. This means there is obviously a requirement for expansion of existing and construction of new waste management facilities. This requirement for expanded and new infrastructure is discussed below.

Materials Recovery Facilities (MRFs)

To prepare received waste for reprocessing, the waste, whether source segregated or not, may have to be delivered to material recovery facilities (MRFs) for sorting, quality checks and bulking. Two distinctly different types of MRFs will have to be considered by the local authorities in delivering their provision of the BPEO within the area.

Clean MRFs

This type of facility takes in the elements of the waste which have been segregated at source i.e. from banks or bring schemes and from separate kerbside collections, where householders place the recyclables in a separate bag or box from their general waste. They can also accommodate the materials recovered through survival bags. This type of collection is through the traditional route, where segregated materials are placed in a bag, which is included with the mainstream collection, to be removed later, either at a transfer station, MRF or mixed waste process facilities (MWPF).

As there typically will be glass, paper, metals, textiles and plastics mixed together from kerbside schemes, they have to be sorted in this type of facility into their constituent parts. This can be done manually or automatically or using a combination of both. Typically, the reject rate would be in the order of 3 to 6% of input.

Dirty MRF or MWPFs

This type of facility is less common, due to the absence of proven technology for separation. However, an intrinsic part of this type of facility will be a pre-treatment phase, to prepare the waste for manual and automatic sorting. The major benefit of such a facility is that it requires no change in the existing collection infrastructure. The attraction to this type of process id that it can use 100% of the waste and that there is no reliance on public participation. This does mean that the process is regarded as socially exclusive. This type of process gained a poor review under the option appraisal due to both these factors and the costs. .

The received waste can treated by a process such as autoclaving, composting or drying. In these processes the fibrous element is screened off, for use as a fuel or for biological treatment, such as composting or aerobic digestion. The remaining elements of the waste are separated either manually or by electro-mechanical means or a combination of both.

Composting Facilities

As the technology for composting evolves, in the light of market requirements and the emergence of composting standards, it is felt inappropriate to be overly prescriptive in the type of facility that will be used for the composting process. However, large-scale facilities will be operated indoors and can take the form of:

- in-bay composting;
- in-vessel composting;
- anaerobic digestion (AD) - while this is not strictly speaking composting, this process involves the biodegredation of waste. Unlike composting where the gasses are emitted directly to atmosphere, AD recovers the methane generated, with a view to recovering the energy value (hence the referral to it in this document as an alternative form of energy from waste).

ACTION 10:
Current home composting initiatives to be encouraged as a means of gaining willing participation and possibly reducing the waste to be managed.

ACTION 11:
Recycling education and awareness raising programme to be undertaken to ensure that the targets are achieved, where source segregation is required.

Recycling Market Development

It is clear that if Scotland is to make better progress in recycling, significant effort must be made to develop both national and local indigenous markets using recycled materials. Progress can also be made in improving the logistics of supply to markets outside Scotland. The UK national WRAP (Waste Resources Action Programme) and ReMaDe (Recycling Market Development) programmes have been established to promote sustainable waste management through the creation of stable markets for recycled materials and products and by removing barriers to waste minimisation, re-use and recycling.

WRAP was established during 2001 to provide a national UK programme to change attitudes to waste minimisation and recycling through creating market confidence and demand for recyclates, improving the economics of recycling and delivery of high quality feedstock to recyclers. WRAP will also seek to reduce the national barriers to recycling, such as specifications and standards for the use of recycled materials.

The ReMaDe Scotland programme was established in 1999 to identify potential markets and uses for recovered materials in Scotland and is the key focal point for recycling market development in Scotland. The programme is in its second year and is focusing on glass, paper and board, wood and composting. One objective of the programme is to provide targeted support for local market development within each of the 11 Waste Strategy Areas.

This is a specific element that requires to be taken forward for development. It has been identified by the stakeholder groups as moving beyond the statutory remit of the local authorities, as it encompasses more then just MSW.

ACTION 12:
Waste Strategy Area Group to develop programmes and events targeting stakeholder involvement for specific objectives to develop recycling markets.

Promotion and Education

The National Waste Strategy: Scotland makes it clear that there needs to be a fundamental shift in attitudes and behaviour of all waste producers in Scotland. There must be an integrated effort of promotion and education to ensure that both householders and businesses are fully aware of the objectives of the Area Waste Plan and have an opportunity to contribute, particularly to the proposed waste recycling and recovery arrangements and waste minimisation initiatives.

ACTION 13:
Waste Strategy Area Group to target stakeholder involvement for specific promotion and education objectives.

Development Planning

Development Plans, at both a structure plan and local plan level, provide the context for appropriate land use decisions for waste management facilities. Currently the Area Waste Plan area is covered by the Ayrshire Joint Structure Plan and the Dumfries and Galloway Structure Plan - both of which have been approved by Scottish Ministers - and a number of local plans all at a formative stage. Both the approved structure plans currently contain policies on waste management planning.

In June 2001 the Scottish Executive published a consultation on a review of the current strategic planning system in Scotland. This review suggests changes to the overall development plan system, and also a proposal that waste should in future be handled by a waste subject plan separate from the development plan system. The Scottish Executive will consider all representations received and make a decision as to the future shape of strategic planning and waste planning in Scotland in early 2002.

The role and responsibilities of planning authorities in the waste management process have already been defined by National Planning Policy Guidance: Planning and Waste Management (NPPG 10), and the NPPG anticipated the introduction of a National Waste Strategy. Whilst the National Waste Strategy and the Area Waste Plans are not land use documents, they are material considerations that planning authorities should take into account when preparing development plans. Interim guidance from the Scottish Executive confirms that the Area Waste plan is a material consideration in the determination of planning applications and that the land-use implications are properly a function of the statutory planning system.

In order to encourage an integrated approach with the new Area Waste Plans, the Scottish Executive intends to publish a Planning Advice Note: Waste Management Planning (PAN 63). The PAN will establish the relationship between area waste plans and the planning process and give advice on good practice in waste management planning.

In the light of these changes and on the completion of the Area Waste Plan, councils will need to consider whether and how urgently development plans should be altered in order to take account of new requirements identified. However, it has to be recognised that the current Area Waste Plan deals mostly with municipal solid waste and further assessment may be necessary on the land use implications of other waste streams.

It is probable that given the scale of the landfill diversion targets, new waste management infrastructure may be required in the coming years. Indeed several Councils, and notably Dumfries and Galloway, are seeking to make provision for the potential expansion and development of facilities. Nevertheless, positive steps are required to assess the further land use implications of implementing the Area Waste Plan.

ACTION 14:
Each local authority to identify BPEO implementation and thereafter to set achievable targets..

ACTION 15:
Waste Strategy Area Group to lobby for introduction of statutory recording of non-MSW waste arisings to enable these waste streams to be adequately planned for in the future.

Performance Indicators and Targets

Performance indicators and targets are an essential part of any implementation process. The National Waste Strategy: Scotland sets out a range of voluntary targets, which are additional to the statutory targets for packaging waste and landfilling of BMW.

The National Targets Group, which consists of representatives from several local authorities, CoSLA and SEPA, is developing a range of indicators and targets which will be used to measure and drive the implementation of all Area Waste Plans. These could range from indicators of recycling activity and landfill disposals, to waste minimisation activities and public attitudes and behaviour. As this consultation is not complete, national performance indicators and targets do not yet exist. This is in contrast to England and Wales where a statutory approach has been adopted, with Councils being given mandatory performance indicators and performance levels.

From the technical yields models run so far, it would appear theoretically possible to achieve a combined composting recycling rate of between 30% and 40% across the whole Waste Strategy Area. Actual delivery will be very much dependant on the systems chosen by the local authorities to implement the generic BPEO. It is essential therefore that those options are finalised as quickly as possible to quantify targets.

ACTION 16:
In conjunction with SEPA's Data Strategy, the Waste Strategy Area Co-ordinators will instigate appropriate data collection studies to inform future developments for commercial and industrial waste management.

Managing Non MSW Waste Streams

It is clear that the present scarcity of good data on waste arisings from non-MSW waste streams is a significant barrier to developing BPEO decisions on the management of these wastes. Area Waste Plans, however, have to ensure that general provision is made for their management whilst setting out ways in which better data will be obtained to improve future decision making for a wide range of wastes produced in Scotland. Section 3 sets out the specific provision required at this stage for the safe disposal of such wastes, the approach to be taken to provide better data and support to producers of these wastes to encourage better waste and resource management practices.

ACTION 17:
Once SEPA has undertaken the above study, the Waste Strategy Area Group will consider how to implement the results.

ACTION 18:
Aims and objectives of future phases of the Area Waste Plan to be identified and group set-up and roles to be determined.

ACTION 19:
Future monitoring requirements to be determined.

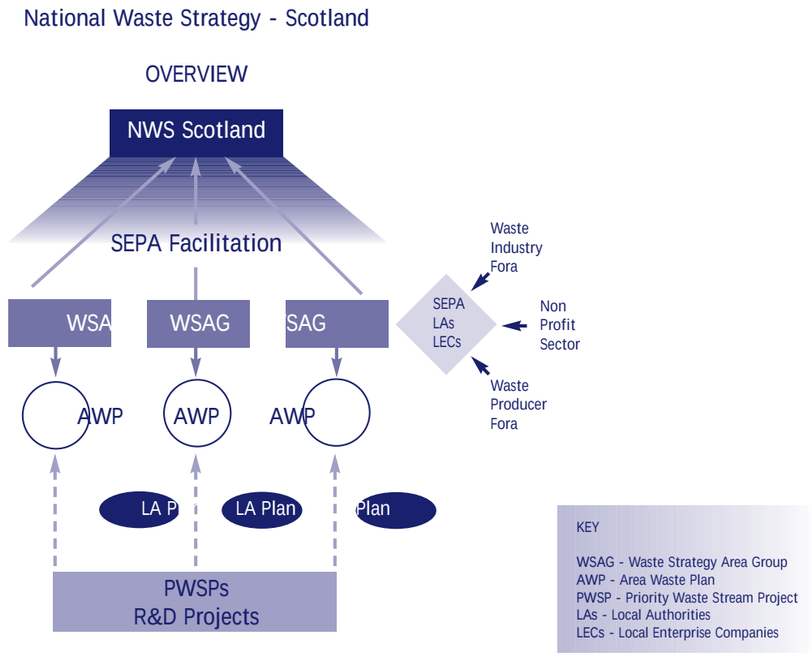
5.2 Methodology

Overview of Methodology

Overview of Process

In designing the strategy, SEPA was concerned to ensure an open and transparent process. Area Waste Plans have therefore been developed through the partnership working of SEPA, local authorities, local enterprise companies, the waste industry and waste producers. Communication between these key stakeholders helped establish the content of the Area Waste Plans. These partnerships and other key principles at the heart of developing Area Waste Plans are indicated in the following diagram.

Figure 11 Overview of National Waste Strategy Process



Strategic Waste Management Baseline Assessment

The Strategic Waste Management Baseline Assessment (SWMBA) is the starting point for the Area Waste Plan. SWMBA reports establish the baseline data on waste arisings and disposals and wastes entering or leaving the area. They also assess the types of waste that arise, how they are currently managed and the existing waste management infrastructure and services in the area. The SWMBA reports for each of the 11 Waste Strategy Areas are available from SEPA.

Options Profiling

The completed SWMBA provides a clear starting point for developing the Area Waste Plan. However SEPA acknowledges that there is a current lack of adequate data on non-MSW wastes and that as a result, the Area Waste Plans are likely to focus on the MSW component of the local waste arisings. The approach to the management of non-MSW commercial and industrial wastes is set out in Section 3 of this document. The next key stage in the Area Waste Plan development process is for the Waste Strategy Area Group to establish a range of integrated options for the management of the wastes arising in or entering the area.

This options profiling stage allows a free-thinking approach to the range of potential solutions and how they can be merged with existing facilities, service and, where appropriate, local authority contracts. These options focus on the key technologies appropriate for the future management of wastes. They may be single technology options or they may integrate a range of technologies. An initial appraisal of these options indicated the weaker choices, leaving a core group of options for further consideration and development.

Stakeholder Consultation

Once the core group of options was agreed by the group, a stakeholder consultation on options or related issues was undertaken. This process ensures that all key stakeholders including the public are asked for their views on the available options or are asked for their views on how they would like to see their waste managed. This enables a wider discussion on what options are proposed and forms a key part of the final appraisal stage where the decision is taken on the option that performs best. Various means are available to undertake this consultation and each Waste Strategy Area Group agreed the most appropriate approach for them.

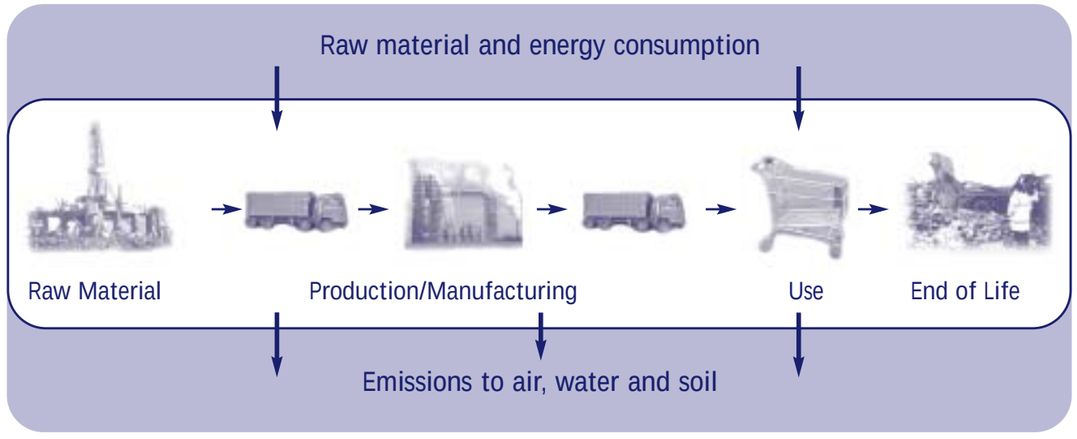
Options Appraisal

This is the key decision making stage. Using feedback from the stakeholder consultation, the group undertook a detailed appraisal of each of the options. This process uses a set of nationally agreed objectives known as decision criteria. These objectives include the key outcomes to be achieved from integrated waste management systems and issues such as environmental protection, social benefits such as jobs, and economic benefits such as support to local industry. To assess the environmental performance of the options, SEPA initiated the application of the life cycle assessment tool, WISARD. WISARD is a software package that allows a detailed comparison of how particular options perform in terms of the life cycle impacts on the environment. It provides a wide range of environmental information on each of the options.

Appraising the options against the other criteria requires evaluating the broader social and economic issues such as number of jobs created, the robustness of the technologies involved and the ability to achieve key objectives of the National Waste Strategy: Scotland. The options appraisal process ensures that the group has good information on how each option will perform, to enable them to make a clear, supportable and transparent decision on the BPEO for the Area Waste Plan.

Life Cycle Assessment (WISARD)

Figure 12 A Life Cycle Approach



At the core of the BPEO analysis of the possible waste management options is the environmental assessment. Any decisions taken on environmental grounds must be done in a rational, transparent and rigorously consistent manner. Such decisions are invariably very complex in their nature, having to take into account a wide range of issues and compare them. The decision-making process must therefore be based on a methodology that will withstand scrutiny by the public, industry and other stakeholders.

The Environment Agency, in collaboration with Eco-Embelage in France, has developed the WISARD life cycle assessment tool. This is designed specifically to apply LCA methodology to strategic waste management planning. SEPA has had WISARD adapted to work within the Scottish context.

Life cycle assessment allows comparison of the environmental costs and impacts of products, or in the case of WISARD, waste management options. It looks at them in terms of resource use and emissions to the environment at every stage in the development and operation of the scenario. This includes raw materials and energy use in the construction of facilities, manufacture of vehicles and bins and an assessment of the emissions from transportation, waste management operations as well as the costs and benefits of the options tested.

It should be noted that WISARD is the first application of a life cycle approach to this type of strategic development and that it forms only part of the assessment of BPEO. As such, the output needs to be supported by other evaluation criteria and expertise on the group. The WISARD tool currently models only municipal and other similar wastes but future modifications will address other waste streams, including a range of industrial wastes.

The application of life cycle methodologies will continue to be developed further for future use.

BPEO Decision, Final Area Waste Plan and Future Developments

The BPEO decision from the options appraisal has been incorporated into this draft Area Waste Plan, together with a range of actions and proposals for non-municipal waste streams. A full-scale public consultation exercise will now be conducted, before the Area Waste Plan is finalised and adopted.

However, to allow for future developments or proposals not included in the plan, BPEO decisions can be superseded by valid proposals that can be shown to provide a better (or equivalent) BPEO. The Waste Strategy Area Group will consider evaluating relevant waste management proposals for an improved BPEO as they arise.

The options included in the BPEO evaluation are generic and for the most part, not site-specific. Hence site-specific development proposals that arise both inside and outside the borders of the Waste Strategy Area are valid and may satisfy or improve the agreed BPEO.

Regional or national-scale waste facilities may be proposed by developers at a scale designed to attract waste from outside the Waste Strategy Area in which they are located. As part of the planning application process, the developer may be required to demonstrate that the proposals satisfy or exceed the BPEO of the Waste Strategy Areas from which the waste will be obtained. The results of this BPEO evaluation may be a material consideration in the planning process for such developments.

Where existing or proposed regional or national–scale facilities will result in waste movement between Waste Strategy Areas, then consideration of the proposed waste exports and imports must be included in the BPEO process, as described in the following sections.

Where export of waste is proposed as an original or developing option for a Waste Strategy Area, this should be considered as part of the BPEO process and/or any subsequent review of the BPEO decision. Waste export should not be undertaken unless it has been specifically identified as the BPEO for that waste stream by the exporting Waste Strategy Area Group, or can subsequently be identified as being better or equal to the originally identified BPEO, using the BPEO appraisal methodology.

Importing waste to a Waste Strategy Area for processing and/or disposal may be already happening or be proposed for the future. Provided that the operations meet the BPEO for the exporting Waste Strategy Area (and that this is confirmed in discussion between the importing and exporting areas), approval of the proposed waste management facilities in the importing area is a matter for consideration by the planning and licensing authorities.

Data

Data Strategy

SEPA recognises the need for an integrated approach to collecting and managing data to meet the many demands for waste management data. Data is required for European reporting requirements, policy planning, reviewing performance, assessing the impacts of new legislation, regulating effectively, aiding academic research and communicating with stakeholders.

A data team of six staff was put in place in summer 2000 and is working to improve the current data situation. Regular annual surveys of MSW and waste management licensed sites are being brought forward. In addition the team is working to improve the quality of data on special waste, priority waste streams and general industrial wastes. Significant improvement will need to be made to the quality of data on waste arisings if the shift to an effective resource management culture in Scotland is to be achieved.

Priority Waste Stream Projects

The National Waste Strategy: Scotland identified 13 separate priority waste streams that will be subject to research study at a national level across Scotland because of their volume, hazardous nature, potential for recycling or their potential to create economic benefit. Each is described in more detail in Section 5.

Summary of SWMBA

As part of SEPA's Data Strategy, to provide an initial basis for future waste planning and to establish the current baseline position for waste management in the Ayrshire Dumfries & Galloway Waste Strategy Area, a Strategic Waste Management Baseline Assessment (SWMBA) was completed during 2000. The SWMBA sought to provide detailed information about the profile of arisings of municipal, commercial and industrial wastes, to predict future waste arisings, to record the licensed waste management facilities (for recycling, treatment and landfill disposal) and to feed this information into the national process.

The SWMBA also set out to define the future statutory restrictions on the disposal of BMW to landfill (as a proportion of the 1995 baseline, as defined in the Landfill Directive) and hence predict the likely quantities of MSW that have to be diverted away from landfill in the future.

While good records of MSW generally exist for each Waste Strategy Area, the data available from the private sector for other waste types (i.e. commercial, industrial, construction and demolition and special wastes) is substantially incomplete and insufficient to provide meaningful input into the future waste planning process. As a result, the draft Area Waste Plan focuses primarily on municipal waste and a strategy is set out for obtaining detailed data on other waste streams to enable more detailed planning in future revisions of the plan. The approach to the management of non-MSW commercial and industrial wastes is set out in Section 3 of this document.

The predicted future waste arisings for household wastes at different growth levels are shown in Tables 21 and 22. The predicted tonnages of BMW and MSW that will have to be diverted away from landfill for this area to meet the Landfill Directive diversion targets are also shown in the same tables. Further discussion on the diversion targets is contained in the section on the Landfill Directive.

Table 21 Likely Future Diversion of BMW and MSW from Landfill in Ayrshire, Dumfries and Galloway at 2% Growth

Waste Tonnages	2010	2013	2020
MSW arisings[1]	417,303	442,845	508,690
BMW arisings[2]	250,382	265,707	305,214
Maximum BMW to landfill disposal[3]	139,528	93,019	65,113
BMW diversion[4]	110,854	172,688	240,101
MSW diversion[5]	306,449	270,157	268,589

Table 22 Likely Future Diversion of BMW and MSW from Landfill in Ayrshire, Dumfries and Galloway at zero Growth

Waste Tonnages	2010	2013	2020
MSW arisings[1]	302,249	300,710	297,150
BMW arisings[2]	181,349	180,426	178,290
Maximum BMW to landfill disposal[3]	139,528	93,019	65,113
BMW diversion[4]	41,821	87,407	113,177
MSW diversion[5]	260,427	213,303	183,973

Notes:

1 Based on assumed MSW annual growth rate of 2% and 0% innate growth plus population change (see SWMBA - appendixes 2 and 3).

2 Assumes that BMW = 60% MSW.

3 Calculated as 75%, 50% and 35% of the agreed 1995 baseline (based on Scottish Executive total MSW arisings for Scotland of 1.8 million tonnes, pro-rated on basis of population).

4 Diverted tonnages - assuming 100% BMW diverted.

5 Diverted tonnages of MSW to ensure BMW diversion tonnages are met (= BMW diversion tonnage x 1.67).

The predicted increase in waste arisings in the Ayrshire, Dumfries and Galloway WSA is ranged between zero and two percent per annum. However it should be noted that waste minimisation will be a significant area of activity in each Area Waste Plan and SEPA expect to see progress in reversing the trends in waste arisings of MSW and other wastes.

Options Profiling

The Waste Strategy Area Group made an early decision to focus on MSW, i.e. household and commercial waste collected by the councils. This was for two main reasons:

- The Landfill Directive targets apply only to the biodegradable component of MSW;
- Insufficient data exists for the other waste streams not collected by the council, such as commercial, industrial and construction and demolition waste.

Full details of the options profiling is set out in Sections 1 and 2 of this document.

Stakeholder Consultation

This document incorporates the stakeholder and public consultation. The results of this exercise will be reported separately and incorporated into the final plan in an accountable and transparent manner.

Options Appraisal

Full details of the options appraisal is set out in Section 3 of this document.

BPEO Decision

BPEO Assessment and Decision

Full details of the BPEO assessment is set out in Section 3 of this document.

BPEO Process

Full details of the BPEO process is set out in Section 1 of this document.

5.3 Managing Other Waste Streams

The following sections describe non-MSW commercial and industrial wastes, each of SEPA's priority waste streams and selected other significant waste streams. However it is acknowledged that this is not intended to be a comprehensive list of significant waste streams. In particular it does not include waste streams that may be locally significant within a Waste Strategy Area as a result of the local industry profile (e.g. food processing wastes, distillery and brewing wastes, petro-chemical industry wastes). As a result, each Waste Strategy Area Co-ordinator will need to develop a profile of the significant local waste streams in their WSA to ensure that these wastes are adequately planned for in the Area Waste Plan.

Each Waste Strategy Area Co-ordinator will also have to track future changes in waste policy and legislation (including changes in the legislative regime with respect to specific waste types) and respond to such changes by making appropriate revisions to the Area Waste Plan.

Commercial and Industrial Wastes

The Area Waste Plan must include provision for non-MSW commercial and industrial wastes. However the common lack of availability of comprehensive and reliable waste arisings data (i.e. waste types and quantities) will restrict the planning process for these wastes at this stage of Area Waste Plan development. Legislation requiring private industry to keep detailed records of its waste arisings may be required in the future. The recent introduction by SEPA's waste data team of quarterly surveys of licensed waste management facilities will, in time, deliver an improved non-MSW commercial and industrial database for Scotland. However in the interim, there is likely to be a continuing lack of robust data, both locally and nationally.

In response, all Waste Strategy Area groups will put in place a programme to fill this data gap locally, to ensure provision of sufficient forward capacity for the management of non-MSW waste arisings. This should include appropriate consultations and surveys with key local industry groupings over a period of time to measure the current arisings of non-MSW in the area. A review of the capacity and type of existing facilities will then be carried out and the forward capacity required to maintain an adequate network of facilities will be identified on the basis of the current management systems for these wastes. This ongoing consultation process will also help to identify and establish local markets for recycled materials.

Action requirements identified to progress - see Action Plan

Special Wastes

The consignment of hazardous wastes in the UK is controlled by the Special Waste Regulations 1996 (which implement the Hazardous Waste Directive 91/689/EEC) and which are administered in Scotland by SEPA. These define special wastes on the basis of a range of prescribed hazardous properties and implement controls on their movement, treatment and disposal using the consignment note system. Scotland currently produces around 200,000 tonnes of special waste each year (from approximately 40,000 consignment notes). A significant proportion of this waste is exported outside Scotland for treatment and disposal.

SEPA's policy on special waste is to encourage producers of this waste to:

- minimise special waste production,
- undertake pre-treatment prior to disposal,
- make arrangements to ensure that Scotland becomes more self-sufficient in special waste treatment and disposal.

Specific Waste Streams

A description of specific waste streams follows, grouped under Priority Waste Streams and Other Wastes.

Priority Waste Streams

The European Commission has identified 11 priority waste streams, which pose a potential threat to the environment. In many cases they are, or soon will be, subject to specific legislation and separate reporting requirements. The National Waste Strategy: Scotland identified 13 separate priority waste streams that will be subject to research study at a national level across Scotland because of their volume, hazardous nature, potential for recycling or their potential to create economic benefit. The list of priority waste streams includes special waste. Each of the other priority waste streams is described in the following sections.

Construction and Demolition Waste

Construction and demolition waste is recognised as the largest single source of waste arisings in Scotland, likely to be well in excess of the reported disposal figure of 5.1 million tonnes for 1998. Together with MSW and commercial and industrial waste, this is one of the three main components of controlled waste arisings. Most is bulky, inert and not suitable for incineration or biological treatment, e.g. concrete, brick, tiles, glass, insulating materials, gypsum, plastic, metals and subsoil. However smaller quantities of biodegradable materials such as topsoils, blacktop and wood are also typically present.

Traditionally the bulk of construction and demolition waste in Scotland has been disposed of to landfill. However changes in the waste management licensing regulations and the introduction of the landfill tax on inert waste disposal in 1996 resulted in a significant reduction in the reported quantities of this waste stream. An increasing proportion has been disposed of at sites exempt from licensing or is being treated in screening and crushing plants prior to re-use as a replacement for bulk or engineering fill. The primary aggregates tax introduced in April 2002 at £1.60 per tonne is likely to enhance this trend.

Other European countries report recycling rates of up to 90% and this indicates that there is considerable potential in Scotland to significantly increase the level of re-use and recycling. A range of useful guidance notes on waste minimisation, re-use, recycling, design and site operations are published by CIRIA. Current constraints on the wider use of recycled materials include the need to develop specifications for the use of secondary materials and wider acceptance of these by the engineering community.

Packaging and Packaging Waste

The results of a packaging waste survey conducted by the Environment Agency estimated the total packaging waste arisings in the UK to be approximately 9.3 million tonnes a year, of which 55% is estimated to be generated from municipal waste. Proportionally, it is likely that just under 1 million tonnes of this arises in Scotland. Packaging and packaging waste is commonly composed of paper, fibreboard, plastic, glass, steel, aluminium, wood and composites such as tetrapak - a combination of paper, polyethylene and aluminium.

The production and disposal of packaging wastes are controlled by the Packaging and Packaging Waste Directive (94/62/EC). The UK has implemented this Directive by introducing the Producer Responsibility Obligations (Packaging Waste) Regulations 1997 and the Packaging (Essential Requirements) Regulations 1998. The Packaging (Essential Requirements) Regulations are designed to ensure that packaging is minimised and is capable of being recycled or recovered. The Producer Responsibility Obligations (Packaging Waste) Regulations are designed to ensure that the packaging is recycled and recovered.

The Producer Responsibility Obligations (Packaging Waste) Regulations came into force in the UK in March 1997. These require that by 30 June 2001 50 to 65% of all packaging materials are recovered and within this target that 25% to 45% of these materials are recycled (to comprise a minimum of 15% of each individual packaging type). The obligations are discharged under a shared producer responsibility arrangement in which the targets are shared among all businesses involved in the packaging chain and which have an annual turnover in excess of £2 million and handle more than 50 tonnes of packaging a year. These targets will increase, following revisions to the Directive this year.

Obligated companies can discharge their obligations through:

- registering with SEPA or the Environment Agency (EA) and meeting their own recovery and recycling targets, or
- off-setting their liability by joining one of the UK compliance schemes which ensure that the aggregate obligation which the members bring to the scheme are met.

The system of Packaging Waste Recovery Notes (PRNs), issued by accredited re-processors, allows compliance schemes and obligated companies to meet their recovery and recycling obligations through purchase of PRNs at the market value. However because companies often include both Scottish and non-Scottish subsidiaries and may register with either SEPA or the EA, it is not possible to disaggregate Scottish performance data from the UK total.

Earlier in 2001 the Scottish Executive carried out a study to identify packaging waste sources and re-processors. The results of this study will help to inform SEPA's planned priority waste stream project on packaging and packaging waste in Scotland.

From the technical yields models run so far, it would appear theoretically possible to achieve a combined composting/recycling rate of between 30% and 40% across the whole WSA. Actual delivery will be very much dependant on the systems chosen by the LA's to implement the generic BPEO. It is essential therefore that those options are finalised as quickly as possible so as to quantify targets and thereafter identify potential packaging materials recovery and recycling rates

Waste Electrical and Electronic Equipment (WEEE)

It is estimated that between 650,000 to 1 million tonnes of waste electrical and electronic equipment are discarded by householders and commercial groups each year in the UK. WEEE is composed of a complex array of product types and the materials they contain also vary enormously, for example an average TV contains 6% metal and 50% glass whereas a cooker is 89% metal and only 6% glass. Other raw materials used in the manufacture of electronic equipment include ferrous metal, non-ferrous metals, such as zinc, lead, cadmium, and mercury, plastics, ceramics, precious metals, PCBs and a wide range of other substances such as arsenic, phosphorous and bromine.

The main categories of equipment that comprise WEEE are:

- Large household appliances (including white goods)
- IT and telecommunication equipment
- Consumer equipment such as radio, TV, cameras and audio
- Small household appliances such as vacuum cleaners, irons, toasters
- Electronic and electrical tools such as drills, saws, sewing machines and garden equipment
- Lighting equipment, including fluorescent and gas discharge lamps
- Four other categories - Toys, leisure and sports equipment; Medical devices; Monitoring and control instruments; Automatic dispensers.

The traditional disposal route for used electronic appliances is to landfill or incineration. This is thought to be unsatisfactory since it results in the total loss of the considerable resources used in manufacture, there is an environmental cost of producing the raw materials and potential environmental damage resulting from disposal or incineration of these potentially toxic materials.

The major proposed European Directives affecting WEEE are:

1. Directive on waste electrical and electronic equipment (WEEE Directive);
2. Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS Directive); and
3. Directive on the impact on the environment of electrical and electronic equipment (EEE Directive).

The fourth draft of the WEEE Directive has recently been adopted and the first part should be transposed into UK law during 2003. The main aspects of this Directive are:

- Waste Prevention: for example through use of recycled plastics and minimal use of dangerous substances;
- Collection and Treatment: removal of all fluids and establishment of collections and producer sponsored 'take back' systems;
- Recovery: establishing systems and targets for component, material and substance re-use and recycling, ranging from 70 to 90% recovery.

Fluorescent tubes are part of the WEEE lighting equipment category and annually the UK disposes of 80 million of these each year. Fluorescent lighting and high pressure sodium lamps contain small amounts of a range of potentially harmful substances such as mercury, cadmium and lead. The RoHS Directive will drive ongoing technical improvements to reduce the amount of these metals used.

In future, producers of electrical and electronic equipment may have to provide take-back facilities for customers, either though in-store initiatives or through existing municipal waste collection systems.

End of Life Vehicles (ELVs)

The recovery of motor vehicles to re-use parts or reclaim materials for re-use or recycling is not a new industry and in the UK almost all vehicles are collected at the end of their lives for some form of recovery. In 1997 and 1998 an average of 75% by weight of materials from ELVs was recovered through re-use of spare parts and metals recovery, with over 95% of the metal content typically being recycled. The recovery process typically involves removal of re-usable parts, followed by shredding to recover both ferrous and non-ferrous metals. The remaining materials, fragmentiser waste or shredder residues, generally comprise plastics, rubber, glass, textiles and foam and are normally disposed of to landfill.

The Automotive Consortium on Recycling and Disposal (ACORD) Annual Report 1999, estimated that 1,900,000 vehicles were scrapped in the UK in 1997 and 1,800,000 in 1998. The weight of an average vehicle is estimated as 1.06 tonnes, including engine and gearbox. On the basis of the ACORD data, SEPA estimate that there were about 146,500 tonnes of ELVs in Scotland in 1997 and 141,000 tonnes in 1998, excluding vehicles brought directly from abroad. Almost all of the material recycled was exported outside Scotland.

Under the EU's Priority Waste Streams Programme a Directive on ELVs was adopted in October 2001 and is expected to be implemented in the UK during 2002. The Directive will require member states to:

- set up systems to ensure that ELVs can only be scrapped by authorised dismantlers or shredders, which must meet tightened environmental treatment standards, from the outset;
- ensure that economic operators, including producers, dismantlers and shredders, establish adequate systems for the collection of ELVs, from the outset;
- ensure that last owners are able to return their vehicles into these systems free of charge, from January 2007;
- ensure that producers (vehicle manufacturers or importers) meet 'all or a significant part' of the costs of takeback or treatment from January 2007 at the latest;
- achieve progressively higher re-use, recycling and recovery targets of 85% of total weight of all ELVs by January 2006 and 95% by January 2015;
- restrict the use of heavy metals in new vehicle manufacture from July 2003.

Scrap Tyres

Scrap tyre disposal continues to be a major problem across the European Union. Of the 2.5 million tonnes of post consumer tyres which arose within the EU during 1998-1999, 39% were landfilled, 20% re-used for energy recovery, 18% recycled (e.g. through granulation), 12% re-treaded and 11% exported. The Landfill Directive bans the landfilling of whole tyres by 2003 and shredded tyres by 2006. It is estimated that in the UK, between 18 and 26% of scrap tyres are re-treaded.

The Environment Agency's Tyres and Environment Report 1998, estimated that approximately 380,000 tonnes of waste tyres were scrapped in the UK during 1996, from both ELVs and existing vehicle use. There are no separately available figures for the quantity of waste tyres arising in Scotland; however this is estimated to be 28,000 to 29,000 tonnes, assuming that waste tyre arisings are proportional to the number of vehicles on the road. Scrap tyres are being investigated in a Priority Waste Stream Project, linked with ELVs.

Tyres have a higher calorific value than coal and therefore offer considerable energy from waste potential. Scrap tyres can be used as an alternative fuel source in cement kilns, saving large amounts of fossil fuels and shredded scrap tyres are used as a substitute fuel in at least one industrial process in Scotland. Tyres also yield significant quantities of steel which can be extracted using magnets during granulation or recovered from the residue after incineration.

Granulated tyres can be used as a replacement for virgin rubber in a wide range of applications including brake linings, landscaping mulch, playground and athletics track surfaces, carpet underlay and rubberised asphalt for constructing pathways and quieter, better quality and more durable road surfaces. This latter application has the potential to use a large proportion of the UK's waste tyres. Recent technological advances in de-vulcanisation indicate that it will be possible in future to recycle scrap tyres for re-use in tyre manufacturing.

Batteries

Waste batteries can be split into two main categories:

1. Lead-acid batteries: these contain liquid and are most commonly used in vehicles or for emergency standby power;
2. Dry cell (or paste) batteries: these are smaller and the most common type for domestic uses; typical types are zinc carbon, alkaline or nickel-cadmium.

Lead-acid batteries are classified as special waste and are typically collected by vehicle dismantlers and sent for reprocessing at specialist recovery facilities, where the sulphuric acid and lead plates are recovered for reprocessing and the plastic cases either recycled or sent to landfill. The estimated UK recycling rate is around 67% by weight.

Facilities in the UK for recycling domestic batteries are almost non-existent and it is estimated that virtually all of the 634 million batteries of all types purchased each year end up in the domestic waste stream and ultimately landfill, where the contents are likely to leach out into the local environment. Dry cell batteries contain heavy metals such as lead, mercury and cadmium, as well as a range of other metals that have significant adverse health and environmental implications. Including batteries in household waste that is to be used for composting greatly reduces the quality of the compost produced.

Batteries are manufactured by a wide range of companies using many different shapes, colours and inner construction details, so that sorting them for effective collection and recycling presents significant challenges. Also, the technology involved in reprocessing and recycling batteries and in extracting the heavy metals, is still in its infancy. However, it is expected that this technology will improve to allow greater recovery of batteries.

Waste batteries are an EU-wide problem and the EU is currently working on a draft Directive to control waste batteries and accumulators. An official draft has not been completed. However the following proposals are likely:

- an immediate ban on all batteries containing mercury and phasing out cadmium by 2008;
- targets to collect and recycle 75% of consumer batteries and 95% of industrial batteries by 2008;
- target to recycle no less than 55% of the materials recovered from spent batteries.

Waste Oils (including solvents)

Most waste mineral oils and solvents are classified as special waste and waste oils accounted for 29% of the special waste stream in Scotland in 1998. Much of the waste oil collected in the UK is processed by removing excess water and filtering out particulates and used as a fuel in heavy industry and power stations. However tighter air emission limits and fuel quality controls resulting from Integrated Pollution Prevention and Control legislation is likely to reduce the amount of waste oil used in this way.

The preferred option for lubricating oils is re-refining for re-use as a base lubricant, although this does not occur on a large scale in the UK. Waste solvents can also be recovered for secondary uses in this way.

SEPA launched the Oil Care Campaign in 1999 in response to a growing concern over illegal dumping of waste oils. Oil is the cause of more than 35% of water pollution incidents in Scotland and more than half of Scotland's serious water pollution. Oil wastes will be the subject of a Priority Waste Stream Project to investigate arisings, recycling and recovery activity and also to look at the barriers to increasing use through these routes. The Priority Waste Stream Project will also consider non-special waste oils.

Newsprint

It is estimated that approximately 2.8 million tonnes of newsprint for newspapers, magazines, catalogues and pamphlets was used in the UK in 1998. More than half of this was imported, with the remainder being produced at three newsprint mills in England. Around 30% of the UK production is recovered for recycling.

There are no separate figures for Scotland; however it is estimated that around 280,000 tonnes of post-consumer newsprint enters the waste stream each year in Scotland. The volatile markets for post-consumer paper and the distance to the existing newsprint mills are barriers to increasing the present level of newsprint recycling. The UK waste and resources action plan (WRAP) is looking at ways to support additional recycling capacity for post-consumer newsprint.

A voluntary agreement was put in place between the DETR and the newspaper publishers to increase the recycled content of newspapers from its current level of around 52% with the following targets:

- 60% recycled content by end of 2001;
- 65% recycled content by end of 2003;
- 70% recycled content by end of 2006.

Clinical Waste

Clinical waste is defined in the Controlled Waste Regulations (1994) and includes the following:

- human and animal tissue, including blood and other body fluids;
- waste drugs and other pharmaceuticals;
- syringes, needles and other sharp instruments;
- swabs, dressings and other waste arisings from medical, nursing, dental, veterinary, pharmaceutical or similar practices.

The principal sources of clinical waste include hospitals, health centres, veterinary surgeries, dental surgeries, GP surgeries, blood transfusion centres, public health laboratories and research and teaching establishments. Clinical waste arisings in the UK have been estimated as almost 400,000 tonnes a year, with around 50% of these being produced by NHS Trusts. Clinical waste arisings from NHS Trusts in Scotland for 1997-1998 were estimated at 15,020 tonnes. Some clinical wastes are also classified as special wastes.

The reduction of clinical waste arisings through re-use of some materials is possible, provided the equipment can be sterilised without difficulty. Clinical waste may also be reduced by pre-treatment to alter the state of the waste so that is no longer defined as clinical waste; this increases the range of final disposal options.

All clinical wastes should be treated and made safe prior to landfill disposal. The treatment options include heat treatment, chemical treatment, irradiation or encapsulation, or a combination of these processes. Modern clinical waste incinerators can deal satisfactorily with a wide range of clinical waste. Suitably designed and run municipal waste incinerators may also be licensed to handle certain types of low-risk non-infectious clinical waste. Anatomical and special waste streams are normally incinerated, with low-risk material and sharps being landfilled after heat treatment and maceration.

Agricultural Waste (including film, pesticides and veterinary medicines)

Much of the waste and by-products arising on farms consists of organic-rich matter such as manure, slurry, silage effluent and crop residues. Around 15 million tonnes per annum of livestock manure and slurry is produced in Scotland, the bulk of this being disposed of by applying to land. Recovering the value from the livestock manures and slurries by introducing valuable nutrients and organic matter to the soil is an economical and environmentally acceptable way of dealing with such wastes, provided they are applied to land in a controlled manner and assist farmers to reduce the amount of inorganic fertiliser applied.

However, farms also produce a wide range of other organic and non-organic wastes, including waste crops, pesticide residues, sheep dip residues, unused veterinary medicines, agricultural plastic film, discarded farm equipment, dead animals, agrochemicals, packaging waste and household waste. At present, agricultural wastes are excluded from the definition of controlled waste, although the UK government has made a commitment to bring the non-natural wastes into the controlled waste management regime.

Disposal of plastic film from farms is a particular problem, since the film is often bulky and contaminated with soil. Consequently farm plastics have either been buried or burned on farm. The UK government has proposed two options for future management:

- a voluntary approach, combined with the forthcoming extension of waste management licensing controls,
- introduction of Producer Responsibility Regulations to place statutory duties on plastic manufacturers to recover farm plastics.

It is estimated that the quantity of non-natural agricultural waste arisings in Scotland in 1998 was slightly less than 100,000 tonnes. Results from a survey by MAFF in March 2000 suggest that about 12 to 15% of agricultural plastics is recycled and that almost all oils arising on farms are recycled or otherwise recovered. Only a very small quantity of scrap metal and machinery is landfilled. Two schemes have been established in Scotland for recycling plastic from farms, with a total membership of around 1,000.

Farmers must have options for the safe disposal of pesticides and veterinary medicines and may need to take these materials directly to the treatment facility, or have them collected by a specialist contractor.

Ozone Depleting Substances (including Chlorofluorocarbons)

Ozone depleting substances (ODS) is the collective name given to over 200 products which have the potential to destroy the ozone layer in the upper atmosphere. These substances are typically used in products for refrigeration, air-conditioning, foam blowing, fire fighting, aerosol sprays and degreasing. The substances can be categorised in a number of groups, such as CFCs, HCFCs, halons, HBFCs and individual products such as carbon tetrachloride and 1,1,1 tri-chloroethane.

ODS are controlled by the Montreal Protocol and the main production of them has been phased out since 1996. EC Regulation 2037/2000, effective from 1 October 2000, requires all ozone depleting substances used in refrigeration and air conditioning equipment, except domestic fridges and freezers, to be recovered during servicing and maintenance of equipment or prior to dismantling or disposal of equipment. After 1 January 2001 recovered CFCs must be destroyed by an environmentally acceptable technology. Recovered HCFCs can either be destroyed or can be re-used until 2015. For domestic refrigerators and freezers, the above requirement comes into effect on 1 January 2002, after which ODS, as both refrigerants and foams, must be recovered and destroyed.

Key elements of good waste ODS management policy and practice include:

- restrictions on the supply and use of all ODS, with an outright ban from 2003;
- mandatory recovery of used controlled substances from non-domestic refrigeration and air-conditioning units, equipment containing solvents and fire protection systems;
- recovery of ODS from other products and equipment, where practicable.

ODS which cannot be recycled must be destroyed at one of the two specialist high temperature incineration plants in the UK. It is estimated that around 280,000 domestic fridges and freezers are discarded in Scotland each year, containing an estimated total of 143 tonnes of ODS.

Household Hazardous Waste

Elements of the household waste stream pose a considerable risk to the environment if they are not handled and disposed of correctly. Although a relatively small percentage of the household waste stream, less than 1%, they do contribute strongly to the environmental impact of household waste, particularly if incinerated or landfilled as part of the general household waste stream. Such materials are known collectively as hazardous household waste and include asbestos, household cleaning products, pesticides, medicines, batteries, fluorescent tubes, waste oils, solvents and thinners, wood preservatives, sharps and needles.

There is little experience of the separate collection and management of such wastes in the UK, although this is much more common in continental Europe. The benefits of such an approach can include reduced water and air pollution, reduced public concern over thermal treatment processes and possibilities for recycling and re-use. The EU is working on a draft Directive on household hazardous waste and this is expected around 2004.

SEPA is considering a series of pilot schemes across Scotland to test best practice for collecting and managing such wastes. For example, collections can be made at civic amenity site drop off points, as door to door kerbside box collections or regular visits to pre-specified locations in the community, similar to mobile library services. Such schemes will assist the clean-up of the MSW stream, enabling cleaner products when waste is processed by recycling or energy treatment.

Other Waste Streams

Litter and Fly Tipping

Litter and fly tipping are common problems in parts of Scotland and are highly visible and unsightly. Local authorities in Scotland are the statutory authorities for litter control and they share with SEPA the powers and responsibility for dealing with fly-tipped material. In one-off cases it is difficult to establish the responsible party and in cases of systematic fly tipping, lengthy site observation is required to identify those responsible.

In view of the diverse nature of the problem, SEPA has not specifically set a target in relation to fly tipping but will work with local authorities to ensure that adequate provisions are available for household and commercial waste.

Asbestos

Asbestos from industrial sources is a special waste and handling and disposal operations are covered by stringent legislation.

However, asbestos in the household waste stream is also defined as special waste under the Special Waste Regulations 1996 as amended. There is therefore a need for general provision or access to suitable facilities for handling and disposal of asbestos from the household waste stream.

Polychlorinated Biphenyls (PCB)

PCBs are found in the form of a stable oily liquid, with excellent insulating and heat transfer properties and a high resistance to chemical and biological degradation over time or when exposed to high temperatures. These properties led to their widespread use in the electrical industry, particularly in capacitors and transformers, but also in cable and wire coatings.

Due to their longevity and adverse environmental and human health impacts, the use of PCBs has been progressively restricted since 1972 and the major sources of PCB waste that now remain in the UK are from closed applications. Under EU and UK legislation all equipment containing PCBs were to be phased out by 1999, with the exception of equipment containing PCB oil with less than 500mg per kg, which can remain in service until the end of their useful working life.

The largest quantities of PCBs were found in the electricity industry in large primary and grid transformers and ancillary electrical switching equipment. However most electrical equipment has now been tested for PCBs by the main electricity companies and where necessary they have been removed.

The main waste management methods available in the UK for the destruction of PCBs include:

- high temperature incineration at more than 1,1000^{c}, the most common method;
- chemical dechlorination to remove inorganic chlorine salts and produce dechlorinated oils.

Most modern electrical equipment is designed to avoid the use of liquid dielectrics and therefore PCBs altogether and now use a gas for the same purpose.

The Environmental Protection (Disposal of PCBs and Other Dangerous Substances)(Scotland) Regulations 2000 placed a requirement on holders of PCBs or PCB-contaminated equipment such as transformers to register with SEPA. Holders must also label equipment and premises holding PCBs, and had to dispose of or decontaminate sources of PCBs by end 2000. For certain applications and users the deadline is extended to 2008.

Contaminated Land Spoil

Contaminated spoil from development of brownfield sites has historically been disposed of directly to landfill - as a cost effective and rapid disposal route. Grossly contaminated materials from these operations often require to be disposed of as special waste. The introduction of new contaminated land regulations in Scotland in July 2000 will continue to drive brownfield land reclamation in future and the need for landfill disposal of contaminated spoil is expected to continue for the foreseeable future. However, the expected likely increases in landfill tax over the next few years will increasingly make landfill disposal an uneconomic option compared with alternative technologies for on-site or in-situ soil reclamation, though this must be balanced against continued landfill tax exemptions that may be available. Councils are preparing contaminated land strategies in accordance with Part IIA of the Environmental Protection Act 1990 (as amended).

Power Station Ash

Pulverised fuel ash (PFA) and furnace bottom ash (FBA) are inevitable by-products of coal-fired electricity generation due to the incombustible material present in coal. The relevant totals for the UK as a whole in 1997 were 1.4 million tonnes of PFA and 5.1 million tonnes of FBA.

Both PFA and FBA are biologically inert and can be recycled as secondary raw materials. PFA is used as a structural fill and a partial replacement for cement in concrete and both can be used as aggregate in concrete. Such use reduces the need for quarrying of primary aggregate with its associated environmental impacts. However the amount of ash that can be sold is dependent on demand from the construction industry and ash that remains unsold is disposed of to landfill. Barriers to the re-use of power station ash in this way are the cyclical nature of the construction industry, uncertainty about composition and quality of the product and transport costs for haulage of the materials.

Fish Farm Waste (and processing)

Waste arisings from fish farm operations and processing include packaging waste (i.e. plastic sheeting, wooden pallets and paper), dead fish and fish processing waste. Common practice in Scotland is to dispose of the general waste and fish processing wastes to landfill. Considerable odour problems can result and most landfill operators seek to control the quantities of fish waste accepted.

Fish mortalities can also be treated by a process of maceration, mixing with formic acid and subsequent heat treatment to recover useable products including lubricating oil, food additives and fertilisers.

Sewage Sludge

Seventy-five percent of sewage sludge was disposed of to sea until the end of 1998 when the practice ceased in response to the requirements of the Urban Wastewater Treatment Directive. However the removal of this route, together with the requirement for improved wastewater treatment has led to a significant increase in the volume of sludge available for recycling.

The responsibility for meeting the requirements of the Directive rests with the Scottish Water, which predicts that by 2005 52% of their sewage sludge will be used on agricultural land, 8% used for land reclamation and 40% for other purposes, including energy recovery and forestry.

Sludge is often spread into or onto agricultural land to provide benefit as a fertiliser or soil conditioner. Recycling sludge to land is regulated by SEPA under the Sludge (Use in Agriculture) Regulations 1989, which set out strict conditions for monitoring the soil and sludge and set application rates based on particular parameters in the sludge.

The UK Code of Practice for the Agricultural Use of Sewage Sludge has been amended to take account of new microbiological standards for treated sludge. Also in the light of this, the European Commission is proposing to revise the Directive and the UK will be introducing new sludge use regulations which will, for the first time, set microbiology and physico-chemical standards for sludge.

Port and Offshore Waste

Port Authorities are required under the Merchant Shipping (Port Waste Reception Facilities) Regulations 1997 to report to government how they plan their port waste reception facilities. Such facilities provide a means of reducing the risk of pollution from shipping to meet the UK's requirements under the International Convention on the Prevention of Pollution from Ships (MARPOL 73/78).

Such plans must:

- assess the amounts and types of waste generated,
- consider the type and capacity of facilities,
- consider the location and ease of use of facilities,
- prepare and submit to government a plan to provide adequate and reasonably priced facilities.

Mine and Quarry Waste

Mine and quarry wastes include materials derived from the overburden, rock inter-bedded with mineral and residues from the processing. They are composed mostly of waste rock, sand and fined-grained tailings. In Scotland, mine and quarry waste is produced in particular from the extraction of coal, slate and vein minerals. These materials are mostly non-hazardous and chemically inert. Other waste materials include abandoned machinery and tyres.

Much of the waste is left on-site as surface tips, which can cause environmental problems, particularly with ferruginous discharges and they can take many years to re-generate naturally. Many of these materials do have the potential for greater use as construction fill or sometimes as high quality aggregate.

Control over the recovery and disposal of mineral waste, from a health and safety perspective, is provided under the Town and Country Planning legislation and the Mines and Quarries (Tips) Act, 1969. However the UK Government has made a commitment to bring non-mineral wastes from mines into the controlled waste management regime.

SEPA believes that many of the potential uses for such waste have already been exploited in the past and that efforts should now be directed towards the beneficial restoration of old mineral workings and the associated tips. Future controls should ensure that the short and long term environmental impacts of the lagoons and tips should be subject to strict environmental controls.

Area-Specific Waste Streams

None identified to date.

5.4 Links to Other Policies

SEPA recognises that the National Waste Strategy is being developed in an environment where other areas of policy and development have to be recognised. When developing the National Waste Strategy, SEPA will, where necessary, try to integrate its activities with the policy areas set out in the following sections.

Corporate Plans (Strategic Plans)

Most Councils produce a corporate plan, either for the following year or more likely for three years. These are key documents as they translate the manifestos of the parties into policies and set out commitments on emerging government initiatives. Corporate plans usually have an analysis of the position the Council finds itself in (demographics, economy, social issues, environmental issues, etc) and the key policies and actions it intends to undertake. It may also contain an explanation of the internal processes of the Council intended to implement the corporate plan.

Economic Development Strategies

Most Councils have economic development teams, and will therefore produce strategies and action plans laying out what these teams intend to achieve. This will often be in addition to any Local Enterprise Company (LEC) Economic Development Strategy they have signed up to. Typical issues covered include company support, trade development, company development, training and New Deal programs, physical enhancement, infrastructure improvements, tourism, links to social inclusion work, and sometimes environmental issues.

Local Transport Strategies

Local transport strategies are a recent innovation designed to bring together all the transport issues for the local authority area. They combine the statutory requirements of the Road Traffic Reduction Act and Road Safety Plans with analysis of the existing pattern of transport and traffic. They usually include plans for new roads and road improvements, bus, cycling, walking and rail projects and are a useful source of transport statistics. They may, and should, be linked to local air quality and planning strategies.

Social Work Plans

Social Work departments must produce a wide variety of statutory and non statutory plans. These include Children's Plans, Criminal Justice Plans, Community Care Plans, Joint Mental Health Frameworks (with the Health Board).

Education Departments

Again a wide variety of plans are required in Education Departments, including curriculum development plans and school development plans. A recent innovation is the need to produce Community Learning Strategies and Community Learning plans to support the new Community Plans (see below). Community learning seeks to involve the Community Education function and other key learning institutions in meeting key learning needs arising from other strategies. For example, the economic development strategy might identify a need for greater IT skills, which the Community Learning Strategy might try to address. Some education departments may also have environmental education plans.

Development Plans

Local authorities are the statutory planning authority and must produce and regularly update land use plans for the area. Structure Plans are key long-term strategic land-use documents, typically produced for a 20-year period, although updated more frequently. They are less detailed and usually give general guidance on areas for development. Local plans flesh out the principles of the structure plan and are therefore more detailed and cover a shorter time frame, typically five years.

Development Plans, at both a structure plan and local plan level, provide the context for appropriate land use decisions for waste management facilities. The importance of the statutory planning system and the relationship with the Area Waste Plan cannot be over emphasised and is covered separately in page 58 of this document under Development Planning.

Local Air Quality Plans

The Environment Act 1995 requires local authorities to review their area and determine possible breaches that may occur to the National Air Quality strategy objectives for key pollutants. Local authorities that identify areas likely to breach these standards must produce a strategy to return the area to compliance, using mechanisms such as controls on development, low emission zones, traffic restrictions etc.

Local Agenda 21 and Environmental Strategies

Whilst these plans are non-statutory, many local authorities will produce one or both. Local Agenda 21 strategies (LA21) arose out of the 1992 Rio Earth Summit and can be thought of as local plans for sustainable development. The Government challenged all authorities to produce such a statement by December 2000. Many LA21 strategies may now be combined with community plans (see below), as they are very similar in nature. However LA21 plans tend to be longer term, more global-to-local in approach and more radical than community plans. Environmental strategies simply draw together of all local authority actions on environmental issues, from transport to purchasing, from waste management to environmental education.

Local Biodiversity Action Plans

Another plan to arise from the 1992 Rio Earth Summit, these plans seek to implement at a local level the UK Government's national Biodiversity Action Plans. Typically, a Local Biodiversity Action Plan (LBAP) will follow a defined process: an audit of existing flora, fauna and habitats, a prioritisation of these against key international, national and local criteria, followed by the development of action plans for the key species.

Housing Plans and Housing Management Plans

These are statements by Housing Department of the range and type of housing required for their area over a three or five year period, and the investment required to meet that need. Housing types cover both standard (Council) housing and special needs housing. Housing Management Plans cover the service provided by the local authority: repairs and maintenance, estate management, tenant participation etc. The mix of housing numbers and types may impact on collection systems.

Other Corporate Plans

Local authority Chief Executives or Corporate Services Departments typically produce a wide range of other policies. These cover plans for both urban regeneration, closely linked to social inclusion, and rural regeneration, sometimes called Rural Development. Typically these plans use ring-fenced government money, together with Structural Funds, to promote community social and economic programs such as training, community transport, credit unions, physical enhancements etc.

Public Private Partnership (PPP)

One aim of government policy is to promote constructive working partnerships between the public and private sectors.

'Using private capital and expertise in the provision of public infrastructure is not new. Joint working between the public and private sectors, in fields such as housing, economic development and regeneration, transport and municipal enterprises, has achieved a great deal over the years. The government is keen to built on this success, by extending successful approaches to delivering good value for money, and by developing new ones'

DETR (1998) Briefing Note Local Government and the Private Finance Initiative.

PPPs are about establishing arrangements, often using a legally binding contract, that will bring benefits to both sectors. Such arrangements can include contractual relationships, management buy outs, externalisation of operational management and use of the Private Finance Initiative (PFI). The PFI is a mechanism for improving value for money in partnership with the private sector and is often applied to large capital projects such as roads, hospitals, schools and prisons. The PFI has also been applied to a range of waste management facilities.

The costs of the various waste management options for MSW highlighted elsewhere in the plan indicate that there may be a need to explore PPPs to deliver certain aspects of the infrastructure required. It will be for the councils to decide on the form that these arrangements take. The Scottish Executive has made clear that to secure any funding from the Strategic Waste Fund, all projects must accord with the local Area Waste Plan, irrespective of whether they are financed using PPP, PFI or other traditional methods of financing.

Best Value

Best Value is the Government's programme to deliver Best Value in Local Government. In essence it aims to provide services that customers want at an acceptable price. A major aspect is that if employed properly it can create the potential to improve the quality of a wide range of services and or generate significant efficiency savings. A Best Value regime will look at the services provided, ask if they are needed, how well are they performed, how well do others do it, how do we compare to others and can we do it better. Further key components include active consultation with service users and periodic reviews on how services are delivered.

Whilst Best Value is a principle that can be applied widely across public sector services there are specific objectives in its application to waste management. These include aspects of collection, treatment and disposal of waste. The final structure and the necessary legislation for its application in Scotland is awaited. The services developed by local authorities as a result of the Area Waste Plans will be developed and managed as part of the Best Value regime.

Renewables Obligation (Scotland)

The Scottish Executive has set out a policy on renewable energy, which aims to stimulate further the development of the renewable energy industry in Scotland. The Scottish Executive's objective is that by 2010 18% of electricity supplied in Scotland should be renewable energy, in other words generated from a renewable resource. The policy has five key aims:

- To assist the UK to meet national and international targets for the reduction of emissions, including greenhouse gases;
- To help provide secure, diverse, sustainable and competitive energy supplies;
- To stimulate development of new technologies needed for growth of the contribution from renewables in the longer term;
- To assist the UK renewables industry to become competitive in home and export markets and in doing so to provide employment;
- To make a contribution to rural development.

In line with the objective and aims, the Scottish Executive is proposing the Renewables Obligation (Scotland) (ROS). The ROS will oblige all licensed electricity suppliers in Scotland to demonstrate that they have supplied a specified proportion of electricity from renewable sources. This specified proportion will increase each year to help achieve the objective of 18% of electricity supplied from renewable sources by 2010. The ROS will revise the previous Scottish Renewables Obligation and the statutory instrument to implement the ROS is expected to be laid before the Scottish Parliament in the autumn of this year, with a view to coming into force on 1 January 2002.

The key renewable energy technologies include wind and wave power, solar energy, biomass production and energy from waste. The specific approach that the ROS will take to energy from waste as a renewable energy source will not be established until the statutory instrument is in place and will depend on the outcome of the current consultation exercise.

Planning

Development Plans, at both a structure plan and local plan level, provide the context for appropriate land use decisions for waste management facilities. The importance of the statutory planning system and the relationship with the Area Waste Plan cannot be over emphasised and is covered separately on page 58 of this document under Development Planning.

There are a number of documents containing guidance for use by policy and land use planners when considering applications for waste management facilities. The primary sources of this guidance comprise:

- NPPG, 10 Planning and Waste Management 1996;
- SEPA, National Waste Strategy: Scotland, 1999;
- SEPA, Supporting Guidance for Area Waste Plans, 2000;
- SEPA, Best Practicable Environmental Option, Decision Making Guidance, 2000.

Despite the current guidance, many planning practitioners have expressed concern as to how they should view applications received prior to and after the adoption of an Area Waste Plan. It is essential that guidance is available to allow consistent consideration of development proposals, and to enable the development plan system to assist in delivering an integrated network of waste management facilities. The Scottish Executive is expected to provide guidance by issuing a Planning Advice Note.

It will be necessary to maintain close working links with planning authorities after the publication of the Area Waste Plan as the plan enters its active development stages. The Waste Strategy Area Group and Waste Strategy Area Co-ordinators will be kept intact to ensure that the partnership approach to the preparation of the plan is maintained to support the integrated development of the plan.

Community Planning

This arose from the perception that public sector planning was fragmented and poorly co-ordinated at a local level, leading to duplication, waste and confusion. Hence since 1999, with councils taking a lead, organisations as diverse as health boards, local enterprise companies, Scottish Homes, SEPA, the police authority and Scottish Natural Heritage have come together to plan the future of the local area. These community plans are being finalised and should contain: a vision for the future of the area, an analysis of the main issues, an audit of current activities, an action plan for change, and a review mechanism. Community plans can cover strategic issues and also be subdivided to tackle very local issues such as traffic, noise, graffiti and green space. As such, community plans offer an important means to have policies endorsed by a very wide range of actors and stakeholders.

Funding

Funding of the necessary investment for new waste management infrastructure and operations may be obtained in a number of different ways, including private finance, through a PPP or PFI arrangement, or traditional direct funding by the local authority. The Scottish Executive has recently established a Strategic Waste Fund that can be used by local authorities to provide the additional funds required to meet the requirements of the Area Waste Plan (refer to SWF Guidance for details). Some additional supplementary funding may also be available in some cases (for non-statutory activities only) from landfill tax credits, EU structural funds and the sale of packaging recovery notes (PRNs). The Scottish Executive is reviewing the longer-term financial needs of MSW management in Scotland.

SEPA's Regulatory Policy

SEPA's Regulatory Policy is aimed at meeting Objective 1 of Schedule 12 of the Environment Act 1995 and ensuring that waste is recovered or disposed of without endangering human health and without using processes or methods that could harm the environment. SEPA's Regulatory Policy therefore recognises the importance of ensuring that its regulatory functions are in line with the objectives of the National Waste Strategy process, and equally, that the Area Waste Plans are realistic concerning the contribution that regulation can make. There is also a need to ensure that each plan addresses forthcoming regulatory issues sufficiently. A full statement of SEPA's Regulatory Policies will be prepared for inclusion in the final Area Waste Plan.

Recycling Targets

Recycling targets are an important driver for stimulating recycling activity. It is clear however that they are not sufficient on their own and it is therefore likely that other instruments may need to be brought in to play, if the significant progress that is needed in recycling in Scotland is to be achieved. These may include both statutory and economic instruments. Local Authority Recycling Plans are a statutory requirement of the Environmental Protection Act 1990. The National Waste Strategy requires SEPA to publish guidance on recycling targets for household wastes and to provide advice to Scottish Ministers on recycling targets that may be adopted. It is likely that these targets will be a major challenge to local authorities and household waste producers in Scotland and will need to be taken account of in Local Authority Recycling Plans. A major effort will also be required in stimulating recycling activity at all levels in society. This will be achieved through a range of public campaigns and initiatives aimed at stimulating a more resource aware culture in Scotland. SEPA will also study with local authorities the potential for household charging and incentive schemes to stimulate improved waste producer awareness and activity.

Awareness, Education and Cultural Change Programme

WAST

The Waste Aware Scotland Team (WAST) was established by SEPA to create a more positive waste culture in Scotland, using a waste education and awareness programme based on best practice from Scotland and around the world. Its specific aims are to establish a strategic framework for education and awareness initiatives in support of the National Waste Strategy and where appropriate to support, facilitate and assist in the implementation of these education and awareness initiatives. The team is chaired by a representative from SEPA and draws its members from local authorities, commerce and industry, the waste management industry and consumer interests.

The process focus of the team will be on formal education, informal learning, professional education and training, public campaigns and information or advice services. The strategic behavioural and cultural change objectives of WAST will be achieved through a number of initiatives which will address all wastes including household, commercial and industrial. Initiatives already underway include the Scottish Waste Awareness Group (SWAG), which will plan and deliver a series of public awareness campaigns across Scotland as part of their Waste Aware Scotland programme to change public attitudes towards reduction, re-use and recycling (see next section). SEPA's commercial and industrial Waste Minimisation Initiative (WaMi) is also continues.

SWAG

The Scottish Waste Action Group (SWAG) will plan and deliver public awareness campaigns on domestic waste management and reduction throughout Scotland. Working closely with SEPA and WAST, it is a resource for local authorities and the National Waste Strategy to deliver local and national campaigns to the public through the Waste Strategy Area groups. SWAG has cross sector support from SEPA, local authorities, NGOs, recycling groups, consumer interests, private waste industry, Keep Scotland Beautiful, the media and the Scottish Executive.

Initially both qualitative (focus groups) and quantitative (door to door surveying) research will be undertaken across Scotland to collate baseline data to assess public attitudes, behaviour and needs and a public wish list on waste reduction, re-use and recovery. The information generated from this exercise will be used to develop promotional material and help direct any subsequent campaign strategies.

Following on from this initial phase a series of pilot campaigns focussing on specific waste minimisation issues will be run concurrently with the implementation of the Area Waste Plans in selected areas. Each campaign will comprise of three stages:

1. Before Survey To assess attitudes and behaviour towards the identified waste minimisation issue prior to the intervention strategy
2. Campaign Intensive localised intervention strategy run initially for six months working in partnership with the Waste Strategy Area Co-ordinator, local authority, local community and voluntary groups, local retailers etc.
3. After Survey To assess attitudes and behaviour towards the identified waste minimisation after the intervention strategy, and to appraise the effectiveness of the different campaigning methods employed in changing attitudes and behaviour.

This format will allow the monitoring of progress towards more sustainable waste management behaviour, and to develop models of good practice for changing public attitudes to reduction, re-use and recycling.

5.5 Next Steps

There are a number of important tasks to be taken forward following the publication of the Area Waste Plan:

- Clearly define the future role of the Waste Strategy Area Group;
- Monitor the implementation of the Area Waste Plan;
- Mandate and integrate the Area Waste Plan; and
- Take forward the specific actions from the Area Waste Plan.

Future Role of Waste Strategy Area Group

The Waste Strategy Area Groups and local fora will be maintained as the focal point for the development of each Area Waste Plan. In this way we can ensure that the Area Waste Plans make good progress. The partnerships developed in these groups and associated fora provide a long term development resource and a way of embedding expertise on a wide range of issues relating to the development of the National Waste Strategy: Scotland. Waste Strategy Area Co-ordinators will also be maintained by SEPA to provide ongoing facilitation and co-ordination and to ensure that the range of national projects related to the National Waste Strategy are integrated into the Area Waste Plans. Waste Strategy Area Co-ordinators will be responsible for co-ordinating the Waste Strategy Area Group and for reporting on the annual progress of Area Waste Plan development. Other partners also have significant roles to fulfil.

This step to be undertaken as part of ACTION 18:
Aims and objectives of future phases of the Area Waste Plan to be identified and group set-up and roles to be determined.

Monitoring Progress and Performance

Each Waste Strategy Area Group will be responsible for developing an annual progress report and an annual forward development plan for the following year. The annual Area Waste Plan progress reports will be provided to the Scottish Executive with a summary of the annual forward development plans. This will ensure that the Executive are aware of progress on each Area Waste Plans and are kept abreast of key issues that need to be addressed.

This step to be undertaken as part of ACTION 19:
Future monitoring requirements to be determined.

Mandating the Plans

Prior to publication of the draft Area Waste Plan and its formal consultation stage, each plan will be reviewed by SEPA and the Scottish Executive. It is important to ensure that each plan is consistent in content and approach, whilst targeted to the specific needs of the area. Integration of the plans to form a coherent set of plans covering Scotland is also important and will be one of the functions of SEPA and the Scottish Executive when reviewing plans prior to their final consultation.

Action Plan

A list of proposed action requirements arising from the Area Waste Plan is given below. It should be noted that this list is a consultative draft and is open to change as a result of this public consultation exercise. It is not regarded as an exhaustive list.

ACTION 1:
Each local authority to ensure that, as their waste management contracts are due for renewal, the chosen options conform to the requirements of the Area Waste Plan.

ACTION 2:
To more clearly define the quantities and nature of wastes in the area, other than MSW, to enable integration of facilities for treatment, where appropriate.

ACTION 3:
a) The need to develop a suitable Waste Strategy Area Group structure to roll out waste minimisation strategies, primarily covering MSW and the local authorities' statutory duties to deal with their wastes.

b) The need for SEPA, through the area waste planning process, to develop suitable structures to roll out waste minimisation strategies, covering internal waste reduction and commercial, industrial waste minimisation.

ACTION 4:
To identify the next elements of the Area Waste Plan and set up aims and objective led groups to specifically target their delivery.

ACTION 5:
Waste Strategy Area Group to develop re-use programmes and events targeting stakeholder involvement for specific objectives.

ACTION 6:
Waste Strategy Area Group to develop recycling and composting programmes and events targeting stakeholder involvement for specific objectives.

ACTION 7:
Waste Strategy Area Group to monitor the Area Waste Plan implementation in achieving the composting and recycling targets identified to meet landfill diversion targets.

ACTION 8:
Waste Strategy Area Group required to investigate availability of reprocessors, markets and end users for recycled and composted materials within the Waste Strategy Area.

ACTION 9:
Waste Strategy Area Group members to examine existing standards and specification for materials to enable where appropriate, local recyclate and compost to be used locally.

ACTION 10:
Current home composting initiatives to be encouraged as a means of gaining willing participation and possibly reducing the waste to be managed.

ACTION 11:
Recycling education and awareness raising programme to be undertaken to ensure that the targets are achieved, where source segregation is required.

ACTION 12:
Waste Strategy Area Group to develop programmes and events targeting stakeholder involvement for specific objectives to develop recycling markets.

ACTION 13:
Waste Strategy Area Group to target stakeholder involvement for specific promotion and education objectives.

ACTION 14:
Each local authority to identify BPEO implementation and thereafter to set achievable targets.

ACTION 15:
Waste Strategy Area Group to lobby for introduction of statutory recording of non MSW waste arisings to enable these waste streams to be adequately planned for in the future.

ACTION 16:
In conjunction with SEPA's Data Strategy, the Waste Strategy Area Co-ordinators will instigate appropriate data collection studies to inform future developments for commercial and industrial waste management.

ACTION 17:
Once SEPA has undertaken the above study, the Waste Strategy Area Group will consider how to implement the results.

ACTION 18:
Aims and objectives of future phases of the Area Waste Plan to be identified and group set-up and roles to be determined.

ACTION 19:
Future monitoring requirements to be determined.

Annexes

Annex 1 Contact Organisations and Links

National Organisations

Scottish Executive
Richard Arnott
Head of Waste Team
Environment Protection Unit
Area 1- J (North) Victoria Quay
Edinburgh
EH6 6QQ
Tel: 0131 244 0200
Fax: 0131 244 0245
www.scotland.gov.uk

WRAP (Waste and Resources Action Programme)
Romney House
43 Marsham Street
London
SW1P 3PY
Tel: 020 7944 8860
Fax: 0207944 8864
www.wrap.org.uk

Scottish Institute of Sustainable Technology Ltd (SISTech)
Tweed Horizons Centre
Newtown St.Boswells
Melrose
TD6 0SG
Tel: 01835 823 507
Fax: 01835 822 991

Scottish Environment Protection Agency (SEPA)
Corporate Office
Erskine Court
Castle Business Park
Stirling
FK9 4TR
Tel: 01786 457700
Fax: 01786 446885
www.sepa.org.uk

ReMaDe Scotland
Caledonian-Shanks Centre for Waste Management
Glasgow Caledonian University
3rd Floor Drummond House
1 Hill Street
Glasgow
G3 6RN
Tel: 0141 404 8890
Fax: 0141 404 8891
www.remade.org.uk

CoSLA
Roseberry House
9 Haymarket Terrace
Edinburgh
EH12 5XZ
Tel: 0131 474 9200
Fax: 0131 474 9292

SEPA's Waste Minimisation Project (WaMI)
SEPA Edinburgh Office
Clearwater House
Heriot Watt Research Park
Avenue North
Riccarton
Edinburgh
EH14 4AP
Tel: 0131 449 7296
Fax: 0131 449 7277

Scottish Waste Awareness Group (SWAG)
Dr Nicki Souter
Campaign Manager
Keep Scotland Beautiful
Stirling
FK8 2ND
Tel: 01786 471333
(NB aligned with UK National Waste Awareness Initiative (NWAI))

SNIFFER
(Scotland and Northern Ireland Forum for Environmental Research)
11/13 Cumberland Street
Edinburgh
EH3 6RT
Tel: 0131 557 2140
Fax: 0131 652 3615

Recycling Advisory Group Scotland (RAGS)
Mr Iain Gulland
5th Floor, Scott House
10 South Street
Edinburgh
EH2 2AZ
Tel: 0131 524 7049
Fax: 0131 577 3787
admin@rags.org.uk

Annex 2 Glossary

Aerobic A process taking place in the presence of air.

Anaerobic A process taking place in the absence of air.

Anaerobic digestion A process where biodegradable material is placed in an enclosed vessel and encouraged to break down in the absence of oxygen. Methane gas and residue suitable for use as a soil improver are produced. It has been used successfully for many years to treat sewage sludge.

Area Waste Group Group responsible for the preparation of the AWP. Members include Local Authorities, SEPA, Local Enterprise Companies, the waste industry and voluntary organisations

Area Waste Plans A key component of the National Waste Strategy: Scotland was the establishment of 11 Area Waste Groups across Scotland. The groups are charged with making the national strategy a reality at a local level, developing local solutions in response to local needs. The groups consist of the local Councils, Local Enterprise Companies (LECs), the Scottish Water Authorities, SEPA and representatives from the waste industry and voluntary and community organisations.

Ash See bottom ash and fly ash.

Best Practicable Environmental Option (BPEO) A BPEO is the outcome of a systematic and consultative decision-making procedure which emphasises the protection and conservation of the environment across land, air and water. The BPEO procedure establishes, for a given set of objectives, the option that provides the most benefits or the least damage to the environment as a whole, at acceptable cost, in the long term as well as in the short term.

Best Value Places a duty on local authorities to deliver services (including waste collection and waste disposal management) to clear standards - covering both cost and quality - by the most effective, economic and efficient means available.

Biological treatment A process involving an enclosed and/or containerised biological treatment system similar to in-vessel composting in which mixed garbage would be mechanically aerated to break down the biodegradable components that could cause emissions of methane and/or generation of leachate.

Biodegradable waste Waste that is capable of undergoing anaerobic or aerobic decomposition, such as food or garden waste and paper and cardboard i.e. waste that rots.

BMW Biodegradable municipal waste.

Bottom ash Ash which falls through the grate. Generally classed as inert and landfilled, or in some places used in construction. Typically 30% of waste input.

Bring site Recycling facilities such as bottle, paper and textile banks often located at supermarkets for use by the public

Biodegradable Municipal Solid Waste (BMSW) MSW is estimated to be 60% biodegradable by composition. Biodegradable waste such as paper, wood and food waste decomposes in landfill sites to produce methane gas and liquid pollutants.

Central composting Large-scale schemes which handle kitchen and garden waste from households and which may also accept suitable waste from parks and gardens.

Civic amenity site Local Authority operated waste collection site where the public can deposit bulky household and garden waste. Civic amenity sites usually also contain recycling facilities for use by the public

Commercial waste Waste arising from premises which are used wholly or mainly for trade, business, sport, recreation or entertainment, excluding municipal and industrial waste.

Community sector Including charities, campaign organisations and not-for-profit companies.

Composting The controlled biological decomposition and stabilisation of biodegradable materials (such as organic garden and kitchen wastes) under predominantly aerobic (oxygen-rich) conditions to produce a humus rich, sanitised and stabilised product that can be beneficial to soil.

Controlled waste Household, industrial, commercial and clinical waste which require a waste management licence for treatment, transfer or disposal. The main exempted categories are mine, quarry and farm wastes. Radioactive and explosive wastes are controlled by other legislation and procedures.

EC Directive A European Community legal instruction which is binding on all Member States and must be implemented through the legislation of national governments within a prescribed timescale.

End of Life Vehicles (ELV) Although not yet Scots Law, a European Directive on ELV will require manufacturers, importers and others in the vehicle use and disposal chain to set up systems for the safe recycling, recovery and disposal of end of life vehicles.

Energy recovery from waste Includes a number of established and emerging technologies. Though most energy recovery is through incineration, and can be used for electricity generation, alternative systems such as anaerobic digestion or recovery of chemical energy are not ruled out.

Environment All the things that surround us from the climate and soil to other living things.

Feedstock Waste materials, either sorted or unsorted, which are fed into a waste management facility be it a materials recovery or energy from waste plant.

Fly ash Ash which is extracted from flue gases. As this is a means of pollution control, this ash is deemed 'special' ie hazardous. Typically 4% of waste input.

Fly-tipping Illegal dumping rubbish in unauthorised places.

Gasification Heating carbon based wastes in the presence of air or steam to produce fuel-rich gases. Heating wastes in the presence of air or steam to produce fuel-rich gases which can then be burnt for electricity and heating, just like natural gas.

Home composting Compost can be made at home using a traditional compost heap, a purpose designed container or a wormery.

Household waste This includes waste from household collection rounds, from services such as street sweepings, bulky waste collection, litter collection, hazardous household waste collection and separate garden waste collection, waste from civic amenity sites and wastes separately collected for recycling or composting through bring or drop-off schemes, kerbside schemes and at civic amenity sites.

Incineration The controlled burning of waste either to reduce its volume or its toxicity.

Industrial waste Waste from a factory (within the meaning of the Factories Act 1961) or from any premises used for or in connection with:

- provision of public transport,
- public supply of gas, water, electricity or sewerage services,
- provision to the public of postal or communication services (s.75 Environmental Protection Act 1990).

Inert waste Inert means any type of waste that does not decompose to produce pollutants.

Integrated waste management Involves a number of key elements, including: recognising each step in the waste management process as part of a whole; involving all key players in the decision-making process; and utilising a mixture of waste management options within the locally determined sustainable waste management system.

In-Vessel composting A composting method in which the compost is continuously and mechanically mixed and aerated in either a large, enclosed area or in smaller enclosed containers. The process and its emissions can be controlled and material can generally be composted much faster than in windrow composting.

Kerbside collection Any regular collection of recyclables from premises, including collections from commercial or industrial premises as well as from households. Excludes collection services delivered on demand.

Land use planning The Town and Country Planning system regulates development and use of land in the public interest and has an important role to play in achieving sustainable waste management.

Landfill Directive A key European Directive that was transposed into UK law in July 2001. The Landfill Directive, agreed in April 1999, aims to prevent or reduce as far as possible the negative effects of landfilling on the environment and human health. The main requirements of the directive include treatment of most wastes before landfilling them; banning the co-disposal of hazardous and non-hazardous waste; banning certain wastes from landfill completely; and targets for the reduction of biodegradable municipal waste to landfill.

Landfill Gas Methane produced as waste breaks down in landfill. This is monitored and can be collected to produce electricity.

Landfill sites Areas of land in which waste is deposited.

Leachate Contaminated liquid which drains from organic materials in a landfill.

Mass burn A type of thermal treatment of waste; mass burn includes a range of combustion technologies such as moving grate, fluidised bed, rotating kiln and oscillating kiln.

Materials recovery facility (MRF) A facility to process wastes for the purpose of recovering useful materials. Materials Reclamation Facility. A facility to process wastes and recover recyclable materials. The waste is transported along conveyor belts and items such as cans, glass, paper and plastic are sorted by type before reprocessing. Otherwise known as a Clean MRF.

Municipal solid waste (MSW) Includes household waste and any other wastes collected by a waste collection authority, or its agents, such as municipal parks and garden waste, beach cleansing waste, commercial or industrial waste, and waste resulting from the clearance of fly-tipped materials.(see MSW relationship with BMW fraction above).

MWPF Mixed Waste Processing Facility A building into which unsorted mixed household waste is delivered for sorting of dry recyclable products from other wet biodegradable waste materials prior to reprocessing and disposal of the non recyclable materials. Otherwise knows as a Dirty MRF.

Packaging waste The Packaging and Packaging Waste Directive 1994 sets targets for the reduction, recovery and recycling of waste generated from packaging, and have been transposed into UK law. Producers of such wastes have a legal obligation, an approach known as producer responsibility. A wide range of materials are covered, from cardboard boxes through plastic bottles and film, to steel cans and wrapping, aluminium cans and glass bottles and jars.

Pyrolysis In this treatment, organic waste is heated in the absence of air to produce a mixture of gaseous and liquid fuel and a solid inert residue (mainly carbon). Pyrolysis generally requires a consistent waste stream such a tyres or plastics to produce a usable fuel product. At present, there is only one facility established in the UK, which takes in tyres.

RDF Refuse Derived Fuel Pre treatment of household waste to create a fuel for facilities such as cement kilns and coal fired power stations.

Recovery Generating value from wastes from a wide variety of activities such as energy from waste plants, recycling and composting.

Recycling Involves the reprocessing wastes, either into the same product or a different one. Many non-hazardous industrial wastes such a paper, glass, cardboard, plastics and scrap metals can be recycled. Special wastes such as solvents can also be recycled by specialist companies, or by in-house equipment.

Reduction See Waste Minimisation.

Re-use Can be practised by the commercial sector with products designed to be used a number of times, such as re-usable packaging. Householders can purchase products in refillable containers, or re-use plastic bags. The processes contribute to sustainable development and can save raw materials, energy and transport costs.

Source separated green waste Grass clippings, leaves, prunings, hedge trimmings and sometimes selected kitchen wastes that have been kept separate from other recyclables or trash. This is excellent for large-scale composting because contaminants are very low.

Source separated recyclables Recyclable materials (e.g., paper, cans, glass, textiles, household organics, plastic, steel, etc.) that have been separated at the point of origin. The separation either takes place within the household (or business/institution) through the use of different containers, or parts of containers for individual materials or at street level.

Special waste Waste which, because of its hazardous properties, is subject to additional legislative controls. Requires specialist handling and treatment or disposal.

Sustainable development Development which meets the needs of the present without compromising the ability of future generations to meet their own needs.

Strategic Waste Management Baseline Assessment (SWMBA) A comprehensive assessment and description of the existing waste management in an area. Examines waste arisings, waste management facilities and capacities, imports and exports of waste, existing contract arrangements and demographics such as population and household numbers.

Strategic Waste Fund A £50 million fund established by the government to allow councils and other partners to begin to implement the Landfill Directive diversion targets. The fund runs for three years from 2001 and requires councils and others to bid for funding for activities in line with the Area Waste Plan.

Survival bags Strong, coloured plastic refuse bag which is filled with dry recyclable waste (e.g. paper, plastics, aluminium) and placed in domestic bin for collection along with non-segregated household waste. The survival bag is then separated from black refuse bags at a MWPF and the materials inside separated for reprocessing.

Thermal treatment See Gasification, Incineration, Pyrolysis.

Treatment Involves the chemical or biological processing of certain types of waste for the purposes of rendering them harmless, reducing volumes before landfilling or recycling certain wastes.

Waste A wide ranging term encompassing most unwanted materials, defined by the Environmental Protection Act 1990. Waste includes any scrap material, effluent or unwanted surplus substance or article which requires to be disposed of because it is broken, worn out, contaminated or otherwise spoiled. Explosives and radioactive wastes are excluded.

Waste arisings The amount of waste generated in a given locality over a given period of time.

Waste Electrical and Electronic Equipment (WEEE) Although not yet Scots Law, a European Directive will require manufacturers and importers to set up systems for the safe recycling, recovery and disposal of end-of-life electric and electronic equipment.

Waste hierarchy Seeks to capture the desirability of different waste management options in descending order of preference, from reducing and re-using waste, through recycling and composting, energy recovery and finally disposal. The concept is meant as a guide to thinking rather than a rigid rule book.

Waste minimisation Systematic prevention or reduction of raw material, water and energy consumption and the re-use and recycling of waste on site, according to SEPA's definition. This has financial benefits for businesses by reducing operating costs and minimising the environmental impact.

Waste Strategy Area The National Waste Strategy will be developed through 11 local groupings which will be known as waste strategy areas. Each WSA will comprise the relevant Local Authorities in each area along with all other relevant parties. Each area will produce an Area Waste Plan.

Waste Strategy Area 9 Comprising Ayrshire, Dumfries & Galloway.

Waste Strategy Area Group This is the main forum tasked with facilitating the Area Waste Plan process and the development of the Area Waste Plan. (see Foreword for makeup of the group).

Waste transfer station A site to which waste is delivered for sorting prior to transfer to another place for recycling, treatment or disposal.

Windrow composting An open-air method of composting in which biodegradable materials are placed in long piles. The term originates from the farming practice of piling hay in rows so that it will dry out in the wind.

WISARD SEPA's life cycle analysis tool.

WSAG Waste Strategy Area Group.

WSA Waste Strategy Area.

Annex 3 Associated reports

The following publications are available from your Waste Strategy Area Co-ordinator at the address below.

SWMBA

WISARD and modelling assumptions

Appraisal results and BPEO decision-making

National Waste Strategy: Scotland

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