



Faculty of Technology



Rubbish, junk, trash: take action on Scotland's waste

Part 2: Why should we reduce, re-use and recycle wastes?



A six-part course prepared by The Open University for the Scottish Environment Protection Agency as part of the Waste Aware Scotland Programme

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1 Introduction

In the first part of this course we looked at the different sorts and amounts of waste produced in Scotland. You will also have looked at the types of material that you throw away and what happens to it when your bin is emptied. You will also have thought about how your activities and the products you buy, affect the amount of waste you produce. We then looked at who is responsible for collecting and processing your wastes, where Scotland's waste ends up and briefly considered the need to change the way we deal with our wastes.

In this part we will look at the legislation and government targets relating to wastes in more detail and then think about the effects that waste may have on the environment. The final part is about 'sustainability' where we consider not just waste, but the effect that all human activities are having on the long-term health of the planet.

2 Legislation

Until the 1970s the legal controls on the disposal of waste to land were less well organised than those for discharges to air or water from industry. The general attitude of the public and the government seemed to be that throwing something onto a rubbish heap or tip was a normal and adequate method of disposal.

Tips that might cause problems to people's health were controlled by local authorities using legislation going back to 1848. By the 1960s problems were beginning to emerge. Hundreds of local authorities across the UK were collecting and disposing of waste with virtually no control. Furthermore, it was becoming clear that some waste materials were dangerous in some way (e.g. toxic or corrosive) and could not be sensibly dealt with in the same way as bundles of old newspapers. Concern was increasing steadily and, finally, when some drums of toxic cyanide waste were found abandoned near a children's play area, there was a demand for action from an outraged public. This quickly led to the *Deposit of Poisonous Waste Act 1972*. This was repealed two years later when the more comprehensive and better considered *Control of Pollution Act 1974* was passed.

Since then, many Acts of Parliament and Regulations have been brought with the aim of reducing the potential for causing harm to people or the environment when waste is disposed of. If you want to study this in more detail the National Society for Clean Air's *Pollution Handbook* [1] includes an excellent summary of the subject. However, in the following paragraphs we will look at the current legislation that has led to the development of national waste strategies.

2.1 The National Waste Strategy

Like much environmental pollution control policy, the UK's waste policies are being developed and implemented in parallel with EU-wide policies. The key aim is to make waste management an environmentally sustainable activity (we will look at sustainability in Section 4 below).

To achieve this aim, those responsible for managing wastes (chiefly businesses and local authorities) have to apply the principle of *best practicable environmental option* (BPEO). BPEO means ensuring that the waste management options selected provide the greatest environmental benefit (or cause the least environmental damage) taking account of the environment as a whole (air, land and water). You should note that the term 'practicable' does not only apply to the technical point of view, but also takes account of what is practicable in terms of costs.

BPEO will depend on local factors but, as a general guide, the *Waste Hierarchy* forms a useful basis for determining how to deal with wastes. We met the hierarchy in Part 1 of the course and it's shown again in Figure 1. The further up the hierarchy (i.e. towards 'Reduction'), the better the option.

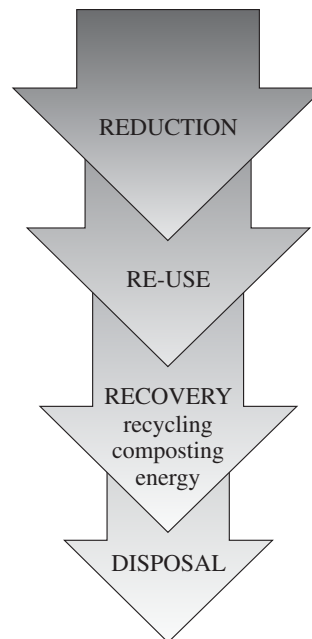


Figure 1 The Waste Hierarchy (adapted from SEPA original)

As well as BPEO and the hierarchy, the *proximity principle* is used in developing waste management solutions. This principle states that wastes should generally be disposed of as close to the point of production as possible. This prevents the export of problems to other regions and countries and recognises that the transport of waste can have a significant environmental impact.

In 1999, using these three principles, SEPA produced The Scottish Waste Strategy which was then adopted by the Scottish Parliament. This strategy required the 11 regional Waste Strategy Areas to produce regional waste management plans. These plans were widely circulated for consultation and then combined into the *National Waste Plan*. (See Section 6 for details of how to obtain a copy of this and related information.) The plan was co-ordinated by SEPA, but involved co-operation with the Scottish Parliament, local government, the waste industry, non-governmental organisations and other stakeholders. This plan sets targets to be achieved for Scotland as a whole. These are shown in the box below.

Scottish waste management targets

Short-term targets for waste collected by local authorities:

- to increase recycling and composting to 25% by 2006;
- to reduce the amount of biodegradable waste sent to landfill to 1.5 million tonnes by 2006.

Longer-term targets:

- stop the growth in municipal waste by 2010;
- achieve 35% recycling and 20% composting of municipal waste by 2020;
- provide 90% of households with kerbside recycling facilities by 2020;
- recover energy from 14% of municipal waste;
- reduce landfilling to 30%.

Source: adapted from SEPA [2]

The plan also summarises the results of a BPEO exercise undertaken in each of the 11 Regional Waste Strategy Area Groups and indicates how municipal wastes will be managed in each in order to satisfy the BPEO principle. This is summarised in Table 1.

Table 1 Proposed BPEO for waste by area

Area	2010				2020			
	Recycle (%)	Compost (%)	Energy recovery (%)	Landfill (%)	Recycle (%)	Compost (%)	Energy recovery (%)	Landfill (%)
Orkney and Shetland	13	4	51	32	13	4	51	32
Western Isles	7	22	7	64	10	28	14	48
Highland	27	13	27	33	31	13	27	29
North East	26	21	20	33	29	21	17	33
Tayside	26	11	21	42	39	14	20	27
Fife	21	10	0	69	30	25	11	34
Forth Valley	19	19	0	62	28	25	17	30
Lothians and Borders	22	23	0	55	34	21	13	32
Ayr, Dumfries and Galloway	19	14	9	58	34	32	5	29
Glasgow and Clyde Valley	28	8	0	64	40	15	13	32
Argyll and Bute	26	24	0	50	26	24	11	39
Scotland	24	14	7	55	35	20	14	31

Source: SEPA [3]

(Note that most areas will be reviewing the technology available for energy recovery in the coming years which may lead to changes in the amount of waste used for energy recovery)

Wherever you live, there will be a need for massive changes in the way waste is managed in the coming years. This will need commitment from the Scottish Parliament, the local authorities and waste strategy areas, but the main effort will have to come from ourselves as individuals and householders.

2.2 Practical reasons for reducing landfill

You may be thinking that all the targets and intentions set out in the *National Waste Plan* are all very noble, but it doesn't really matter if Scotland misses the targets set for itself. Well, apart from the environmental reasons that we will be looking at throughout the course there are three excellent practical reasons for reducing our reliance on landfill: space; cost; the law.

2.2.1 Shortage of landfill

At present (spring 2004) there are about 110 landfill sites in Scotland that are allowed to take municipal waste, but many of these are expected to close in the coming years when tighter operating standards are introduced. SEPA have estimated that there will be only 45 sites remaining by 2007 and there could be as few as 20 sites left by 2020 [3]. Even the best-operated sites do not make very good neighbours (as we will see in Section 3.2.3 below) so any plans for new sites will be strongly opposed by the local people.

The amount of landfill space available varies widely from region to region and some may run out of landfill within the next few years. Without a nationwide reduction in landfill achieved by moving waste management up the hierarchy, this could become a national problem in only a few years.

2.2.2 The Landfill Tax

The producer of any waste that is sent to landfill has to pay a tax to the Treasury in London. As of April 2004 this is £15 per tonne and the Chancellor has indicated that in the coming years this will increase to £35 per tonne. Scotland currently landfills about 2.8 million tonnes of municipal waste a year so, at £35 per tonne, we as Council Tax payers will be spending around £98 million a year on Landfill Tax!

2.2.3 The Landfill Directive

The Landfill Directive [4] requires that member states reduce the pollution caused by the landfilling of wastes. It contains many stipulations, but one of the most important is that all EU member states will reduce the amount of biodegradable municipal waste (mainly paper, card, kitchen and garden wastes), in stages, to a final level of 35% of the amount generated in 1995. This means that by 2020 Scotland will need to divert an additional 1.8 million tonnes of municipal waste a year away from landfill. If the UK fails to meet its targets the European Commission can fine the UK by as much as €500,000 (£350,000) per day. If this happens, no doubt Scotland will have to pay its share.

3 Environmental impacts of waste treatment

3.1 Introduction

Before looking at the material below, spend a few minutes on this introductory activity.

Activity 1

Think about the ways in which waste and the way we dispose of it could cause harm to:

- 1 You and your family/household.
- 2 Other people.
- 3 The environment in general.

and write a list for each of these three.

You have probably written down several factors and some of them will almost certainly be in all three lists. In doing this, you'll also have answered a very important question 'Why do we need to collect and treat waste in the first place?'

Returning to the questions in the activity, let's think about ways in which the waste can harm people directly – both in the home and during collection and treatment. Waste is generally unsightly and unpleasant but here are a few of the, potentially serious, health impacts from household wastes:

- Infection from nappies, hygiene products, animal faeces and contaminated foods.
- Injury from glass, food cans, knives, razor blades, etc.
- Poisoning by household cleaning products, garden chemicals, solvents and paints.

These three groups of material are often called 'hazardous household waste'.

When it comes to industrial wastes the potential for harm is even greater. These wastes may be corrosive, highly poisonous, flammable, explosive or radioactive.

Moving on to look at waste treatment and disposal there is a great potential for causing environmental pollution at the local, national and global level by, for example:

- The congestion, noise and air pollution impacts of waste collection.
- The visual, noise, dust and odour impacts of any waste treatment facility.
- The potential for water contamination from landfill.
- Pollutants in the gases produced by incineration.
- Damage to the 'ozone layer' from the CFCs present in fridges manufactured before 1995.
- The emission of greenhouse gases (methane and carbon dioxide) from landfill sites.

The role of waste management is to ensure that wastes are collected, treated and disposed of whilst ensuring that these potential risks to human and environmental health are eliminated or kept minimised.

Ozone Layer

A thin layer of ozone gas in the upper atmosphere which reduces our exposure to cancer-causing light from the sun.

CFCs

A family of chemicals which were used in fridges, freezers and some plastics until they were banned in 1995. CFCs gradually reach the upper atmosphere where they break down the protective ozone gas.

Greenhouse gases

‘Greenhouse gases’ are gases such as carbon dioxide and methane that are produced by landfills and the burning of fuels. These build up in the atmosphere and reduce the amount of heat lost from the earth’s surface into space. It is widely accepted that the increasing levels of these gases is causing changes to the earth’s climate (such as warmer winters, changes in rainfall) known as the ‘greenhouse effect’ or ‘global warming’.

3.2 Impacts of different waste treatment methods

The Waste Hierarchy that I introduced during Part 1 and in Section 1 above gives a general indication of the most environmentally favourable way of dealing with our waste. Having said that, whatever we do with our waste, some pollution will result. Also, there will be times when it may be better to ignore the strict requirements of the hierarchy and treat the waste locally by energy recovery or landfill rather than by transporting it hundreds (or even thousands) of miles for recycling.

While all waste treatment options have environmental disadvantages, they can also make some positive contributions to the environment. One of the aims of waste management is to reduce the disadvantages while making the most of any benefits.

In Parts 3, 4 and 5 of the course we will be looking at the environmental benefits of waste reduction, re-use and recycling in more detail, but the main benefits are also given here for completeness. It will be helpful for you to remind yourself what types of activities are covered by these three terms by completing Activity 2.

Activity 2

Complete the table below by stating a few activities that can be classed as reduction, re-use and recycling.

Activity	Examples
Reduction	
Re-use	
Recycling	

3.2.1 Reduction and re-use

It may seem obvious to you, but the only reason that we have these waste management problems to solve is because the waste is generated in the first place. Waste reduction and the re-use of waste can help to minimise the quantities of waste that have to be treated. Waste reduction means not generating wastes in the first place and is firmly at the top of the Waste Hierarchy.

Re-use simply means using a product for its original purpose more times than was originally intended by the manufacturer. In some cases items are designed specifically for re-use, e.g. the milk bottle. The benefit seems obvious – if the same item is used again and again then there is no expenditure in energy to manufacture a new product and no cost of disposal. However we must not forget that to use an item again it needs to be returned to the supplier and it will still probably need some kind of treatment, e.g. washing, safety checks to ensure it is still fit for purpose etc. But it resides above recycling in the hierarchy as, generally, much less energy is expended during re-use.

Another example of re-use is the use of cloth, rather than disposable, nappies. This reduces the solid waste sent to landfill – in the form of used nappies – and also eliminates the wastes generated and raw materials and energy used during the manufacture of disposable nappies. On the other hand, using cloth nappies produces liquid waste (from washing) and uses detergents, water and power (especially if they are dried in a tumble dryer) so it's not clear which is the better option. Indeed, the best option could depend on where you live, what your council does with your waste or even on the amount of rain that fell in your area in recent years.

3.2.2 Recovery

Waste recycling can be defined as the collection of waste materials, the separation and clean up of those materials and reprocessing to provide raw materials that are then incorporated into new products. It is important to note that the process of recycling involves all of these stages. When I put bottles, cans and papers out for collection by my local authority I am only starting the recycling process. The materials are not recycled until they are incorporated into new bottles, cans, paper products and similar goods. Recycling is one of the more public faces of waste management and is often seen as 'the only solution' to the waste problem. Although materials' recycling is very popular with the public and well publicised by environmental pressure groups, recycling does not present a total solution. However, in this section we will look at how much household waste is recyclable, how it can be collected and at the markets and values of the reclaimed materials.

Recycling is near the top of the Waste Hierarchy and this is reflected in the ambitious targets for recycling set in the *National Waste Plan*.

Activity 3

Make a list of the materials that are collected for recycling in your area. (You may find it useful to visit your local recycling points or phone your local authority's Environmental Services Department.)

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Recycling wastes has many environmental benefits. For example [5]:

- making newsprint from recycled fibre uses 30% less energy than newsprint manufacturing from virgin wood;
- a 10% increase in the amount of waste glass added to a glass-making furnace reduces energy consumption by 2.5%, particulate material emissions by 8%, nitrogen oxides emissions by 4% and sulphur dioxide emissions by 10%;
- every tonne of steel produced from scrap steel saves 1.5 tonnes of iron ore and 0.5 tonnes of coal, as well as reducing water and limestone use;
- making aluminium cans from scrap achieves a 95% saving in energy use in comparison with aluminium production from the raw material bauxite.

However, these benefits all need to be balanced against the potential environmental disadvantages. Collecting recyclable wastes from each house can double the mileage travelled by council dustcarts and taking materials to recycling banks can generate additional traffic and therefore pollution. Of course these extra pollutants can be reduced (or even eliminated) if a council could collect waste and recyclable materials in the same vehicle and if people were to travel to recycling banks while making another journey – perhaps to the shops.

Like all factories, the sites that process recyclable materials in readiness for transport to industry are potential sources of traffic pollution, noise, smells and dust. In addition, recent research has shown that, at some sites, dust, noise and bioaerosol levels are above recommended maximum levels. (Bioaerosols are micro-organisms such as bacteria and fungi or other tiny biological particles, suspended in the air, which can lead to health problems.)

Once the materials have been processed they need to be transported to the reprocessing factories to be incorporated into new materials. Much of this takes place in Scotland, but some materials are exported to England, the rest of Europe and even as far away as China in the case of certain plastics. Not only do we have to be certain that recycling materials overseas is environmentally beneficial it is also important to ensure that the processing industries operate using health and safety and employment practices that we would consider to be acceptable in Scotland.

Composting

Like recycling, making compost from waste and using it has obvious environmental benefits. Organic waste contributes to the problems relating to landfills discussed below so removing this waste from the landfill has positive benefits. Also, using the compost in place of peat helps to conserve peat deposits which form a unique habitat supporting many rare plant and animal species.

Like recycling, collecting the organic waste can contribute to traffic pollution and the compost site can be a source of dust, smells and bioaerosols.

Making compost at home eliminates the impacts of collecting and treating the compostable wastes, but making compost does involve some effort and skill from the householder if they are to avoid making anything better than a foul-smelling slime. We will be looking at home composting in Part 5 of the course, but for the moment, it's probably safest to regard this as an excellent option for the keen gardener.

Energy recovery

Municipal waste contains energy – about one quarter of the energy of the same weight of coal. So it should be possible to use waste as a fuel. This does happen in Dundee and in Lerwick and, as we saw in Part 1, some European countries burn over half their municipal waste.

Burning waste gives a greater reduction in the amount of residue sent for landfill than recycling and composting and also has the benefit of producing energy and allowing the recovery of metals from the ash. Some of the ash can be used in road building and other construction projects.

There are negative impacts such as the visual impact of the factory and the traffic to and from the site. The chimney does release small amounts of acid gases, dust, metals and other chemicals, but these releases are tightly controlled by SEPA.

The main problem with burning waste is that many people are concerned about the chimney emissions and this concern is based on the operation of incinerators before the emissions were regulated to anything like today's standards. Overcoming these worries presents one of the major barriers to the development of energy from waste.

3.2.3 Landfill disposal

As we have seen, around 92% of Scotland's municipal waste goes to landfill. A well-managed landfill site can be an effective and safe way of disposing of our rubbish. On the other hand, landfills lock up potentially useful resources and they can cause serious environmental problems as described in the following paragraphs.

The first thing to note about landfills is that they tend to be very large sites, often in the open countryside. They can create dust, noise and smells. Litter blown about by the wind can be a problem and some sites tend to attract sea gulls in large numbers.

Having said that, in a survey done in 2000 [6], one third of the people interviewed who lived within two miles of a landfill did not realise that the site was there. Of those who were aware of the site, about half of them said that it caused problems. The main problems were traffic, smells, view, pests/insects, litter and the perception of a danger to health.

On a wider scale, landfills have the potential to cause two main environmental problems.

Firstly, organic material in the waste (such as kitchen waste, garden waste and paper) breaks down to generate 'landfill gas'. This gas is a mixture of carbon dioxide and methane. These gases are both 'greenhouse gases' that contribute to global warming. Methane is also flammable and can cause explosions. These effects are reduced by collecting the gas and burning it to generate electricity. This has the benefits of reducing the contribution to global warming and saving conventional fuels. However, all sites leak to some extent and release these gases.

Secondly, rainfall entering the site percolates through the waste picking up soluble material from the decomposing waste. This liquid is known as 'leachate' and can contaminate underground water running beneath the site. Layers of compacted clay or synthetic materials are used to surround the waste reducing the amount of rainwater entering the site and collecting the leachate at the base of the site – from where it is pumped out from and treated. But no barriers are perfect and some leachate will escape from the site (especially if the liner breaks for any reason).

These possible problems will persist for many decades or even centuries after the site has been filled and such sites will need to be maintained for these long periods.

Before moving onto the next part of the course, which widens our discussions about the environment in general, complete the table shown in Activity 4.

Activity 4

Complete this table by adding two positive and two negative environmental impacts of each waste solution (as you move down the list you should find it harder to complete the first column and easier to complete the second one).

Solution	Positive impacts	Negative impacts
Waste reduction		
Re-use		
Recycling		
Composting		
Energy recovery		
Landfill		

4 Sustainability

As far as we know Earth is the only planet that supports life. All species that inhabit it, from the tiniest microbe to the largest mammal, have some kind of impact as they go about their daily activities. Mostly these impacts are benign and part of wider ecological and biogeochemical systems. For example, a by-product of green plants fixing sunlight energy through photosynthesis is oxygen which is vital for life; beavers making dams change the local aquatic ecosystem making it more diverse and providing home for many more species than would otherwise be supported. Over geological timescales these local and global impacts have tended to exist in balance. More recently and particularly since the industrial revolution, the activities and escalating numbers of one species, humans, has begun to shift the balance in significant ways. For example, our profligate use of finite resources such as oil. Today, 65% of the world's energy is derived from oil or natural gas. New reserves are often in remote and ecologically sensitive areas of the world. North Sea oil has already reached what the industry refer to as 'rollover' – i.e. demand exceeds supply.

We are probably looking at a peaking of conventional oil supply within the next two or three decades.

Ged Davis, Head of Shell's Global Business Environment Division, October 2002.

In terms of the human population, the global picture is alarming. A quarter of the world's people have to survive on incomes of less than 70 pence a day. A fifth have no access to health care. One sixth (1.1 billion people) have no adequate water supplies and one third (2.4 billion people) have no access to adequate sanitation facilities. It is estimated that by 2025, two thirds of the world's population will be affected by water shortages. Huge though the challenge may

seem today, it is becoming larger. The world's population will increase by half, approximately another three billion people, by 2050 [7].

If the world continues down its current path, 'economic disparities between industrial and developing nations will move from inequitable to inhuman'.

Gustave Speth, United Nations Development Program

Clearly, the present situation cannot continue indefinitely and there must be changes in the future. The alternatives: widespread famine; disease outbreaks; wars. Sustainable development is one possible solution.

There are many ways of defining 'sustainability'. The most famous definition is the one devised by the World Commission on Environment and Development chaired by the Prime Minister of Norway, Mrs Gro Harlem Brundtland in 1987 [8]:

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

On its website, The Scottish Executive's Environment and Rural Affairs Department explains the aims of sustainable development as set out in the box below.

The fundamental aim of sustainable development is to secure the future. We have seen how actions in the past have made life more difficult for us today. Developing sustainably means ensuring that our actions today do not limit our quality of life in the future. So our vision is based on the principles that we should:

- have regard for others who do not have access to the same level of resources, and the wealth generated
- minimise the impact of our actions on future generations by radically reducing our use of resources and by minimising environmental impacts
- live within the capacity of the planet to sustain our activities and to replenish resources which we use.

Source: Scottish Executive [9]

But what does this mean in practice? In summary, sustainability is all about leaving the planet in as good (or a better) state at the end of one generation's lives as it was at the start. For example:

- not reducing the overall stock fuel and mineral resources;
- not increasing (or better still, reducing) the quantities of pollutants in the air (including carbon dioxide);
- ensuring that all wastes are treated by the generation that produced them to prevent any harm to future generations.

As we point out above, sustainability is also about creating a more equitable world and ensuring that everyone has a right to the basics of life such as water, food, shelter and healthcare.

At the personal level The Scottish Executive goes to explain that the key principle is to ‘Do a Little – Change a Lot’ (<http://www.dochange.net>). For example they suggest:

- reducing the wash temperature of washing machines;
- not overfilling kettles and so boiling only the water needed;
- turning central heating thermostats down by 1⁰C (this would save the average household £40 per year);
- composting garden waste.

Activity 5

From your reading of Sections 3.2.1, 3.2.2 and 3.2.3 think about how sustainable the following waste management options are.

- 1 Reduction and re-use
- 2 Composting
- 3 Landfill

4.1 Sustainability and Scotland

In 1992 nearly 180 countries meet at the ‘Earth Summit’ (UN Conference on Environment and Development) in Rio de Janeiro to discuss how to achieve sustainable development. The Summit agreed the Rio Declaration on Environment and Development which sets out 27 principles supporting sustainable development. It also agreed is a plan of action known as ‘Agenda 21’, and a recommendation that all countries should produce national sustainable development strategies.

Two years later, the UK becomes one of the first countries to produce a sustainable development strategy in response to the call made at Rio, *Sustainable Development: The UK Strategy* [10].

Since then, all Scottish local authorities have appointed local Agenda 21 coordinators to promote sustainability within their areas. Also, various UK and Scottish organisations have produced documents to assist local authorities in drawing up sustainable development plans. The Sustainable Scotland Network, in partnership with The Scottish Executive and CoSLA (The Convention of Scottish Local Authorities), produced the *Scottish Local Agenda 21 Route Planner* [11]. This document provides a flexible framework for local authorities to develop Sustainable Development strategies responsive to the particular needs of their communities.

It is also important to measure progress towards these plans and in 2003 the Scottish Executive Environment Group published *Indicators of Sustainable Development for Scotland* [12]. These 24 indicators cover everything from increasing growth without increasing pollution through reducing unemployment to reducing crime and increasing people’s contributions to voluntary work for the good of the community.

Waste is covered by three of these indicators that call on Scotland to:

- End the growth in municipal waste by 2010.
- Recycle and compost 25% of municipal waste by 2006.
- Reduce the amount of ‘biodegradable’ (paper, kitchen and garden waste) sent to landfill to 1.25 million tonnes a year by 2010.

Activity 6

Sustainability encompasses more than just issues of waste, so take a moment to list a few activities that you can do, or changes that you can make to your lifestyle, that would allow you to do something to bring about a more sustainable Scotland.

4.2 Ecological footprints

Ecological footprinting is a technique used to measure the area of land and water that would be needed to support a given human population with a given standard of living continuously. This technique estimates how much land and water is needed to provide a population's food, water, energy and mineral resources and how much is needed to assimilate the population's waste products and absorb the carbon dioxide released by the population.

If the world was in a sustainable situation, the ecological footprint would be equal to the size of the planet. Unfortunately, this is not the case as the following figures show:

- A study of London carried out in 2002 showed that London's ecological footprint is about twice the size of the UK. This means that if everyone in the world had a material lifestyle equal to that of the average Londoner, we would need at least three Planet Earths.
- A similar project in Wales suggested that if everyone in the world had a lifestyle like the typical Welsh resident we would need about 2.75 Planet Earths.

Calculating an area's ecological footprint is really just the first stage of a process that should eventually lead to a reduction in the size of that footprint. Have a look at Activity 7 below before reading through the final paragraphs.

Activity 7

Write down the areas of your life that you think make the greatest contribution to your own ecological footprint.

Your answers will depend on where you live and work and what your hobbies and interests are. However, a recent report *Scotland's Footprint – A resource flow and ecological footprint analysis of Scotland* by Best Foot Forward Ltd [13] has produced an ecological footprint for Scotland as a whole. You can find this report on the internet at <http://www.scotlands-footprint.com> (click on the 'download' button and then choose either the whole report or the summary), but the main finding was that if everyone on the planet consumed as many resources as the average Scottish resident we would need a total of 2.8 Planet Earths.

The breakdown of Scotland's ecological footprint is given in Figure 2.

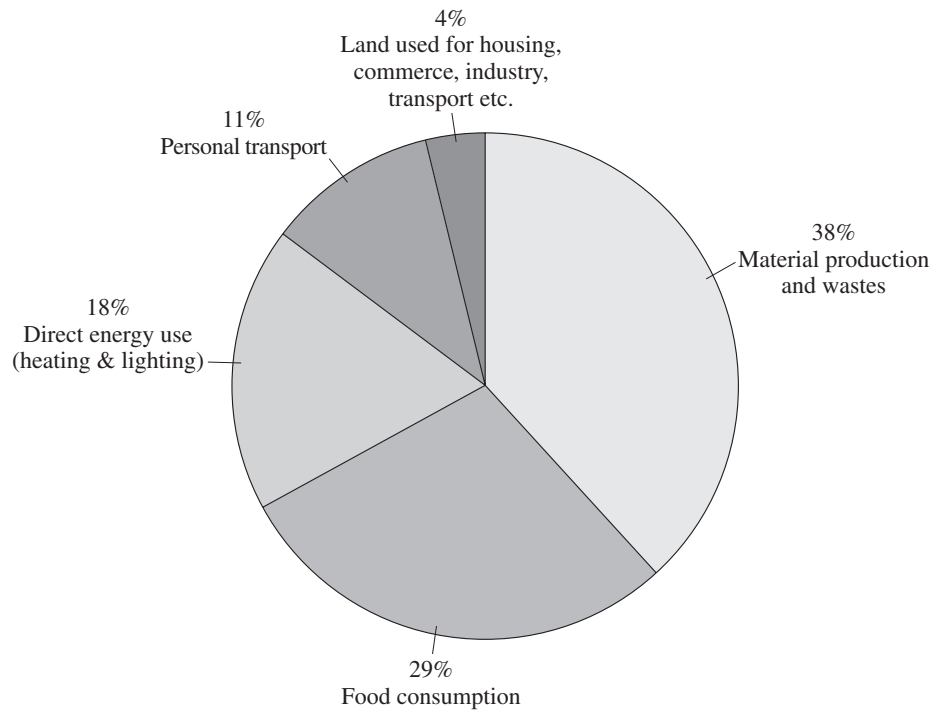


Figure 2 Contributions to Scotland's ecological footprint (source: adapted from Best Foot Forward [13])

The report also illustrates the importance of the choices and actions taken by individual people by stating that:

- Household waste accounts for 44% of the materials and waste footprint
- Over two thirds of the energy footprint is due to household energy use.
- Nearly 80% of the personal transport footprint is due to car use.

5 Conclusions

During this part we have looked at the changes that Scotland is intending to make to the way it deals with its waste. This will involve a move from a reliance on landfill by much more recycling, composting and energy recovery. However, the best options of all are to reuse materials that would otherwise be thrown away and to not produce the waste in the first place.

There are practical, financial and environmental benefits in making these changes but whichever options we adopt, there are always some environmental disadvantages.

Finally we considered sustainability. In summary this means using fewer resources to allow future generations and the whole of the world to have access to the basic necessities of life.

In the remaining sections of this course we will be looking at the different ways of putting the Waste Hierarchy into practice.

6 Where to find help and information

6.1 SEPA

SEPA's website (<http://www.sepa.org.uk>) contains full details of SEPA's work in protecting the environment.

6.2 Other useful websites

- Copies of the 'National Waste Plan can be downloaded from SEPA's website at:

<http://www.sepa.org.uk/publications/nws/index.htm>

- The 11 Area Waste plans are on the following page:

<http://www.sepa.org.uk/nws/guidance/awp.htm>

Alternatively, you can order copies of these documents by calling the Waste Action Line on 0800 389 5270 (freephone).

- The Scottish Executive's Environmental and Rural Affairs webpages can be found at:

<http://www.scotland.gov.uk/Topics/?pageID=63>

These contain a range of information on sustainability, climate change, waste and other environmental issues.

- Information on the 'Do a Little – Change a Lot' campaign and links to many other environmental websites can be found at:

<http://www.dochange.net>

- *Scotland's Footprint – A resource flow and ecological footprint analysis of Scotland* by Best Foot Forward Ltd [13] can be downloaded from:

<http://www.scotlands-footprint.com>

6.3 Where can I learn more?

If you are interested in continuing your studies of wastes and waste management, the environment or any other subject you may find it useful to contact:

- your local adult education centre
- your local college
- The Open University (www.open.ac.uk or call The Open University in Scotland on 0131 225 2889 or The Open University's central enquiry line on 0845 300 6090).

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 - Oxfam <http://www.oxfam.org.uk/>
 - The World Health Organisation <http://www.who.int/en/>
- 8 United Nations Commission on Environment and Development (1987), *Our Common Future*, Oxford University Press
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- 10 HMSO (1994), *Sustainable Development: The UK Strategy*, ISBN 0-10-143452, Cm 2426, London,
- 11 The Scottish Executive (1998), *The Scottish LA21 Route Planner*,
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- 13 Best Foot Forward, (2004) *Scotland's Footprint - A resource flow and ecological footprint analysis of Scotland*, <http://www.scotlands-footprint.com>
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