THE UNIVERSITY OF
NORTHAMPTON

Waste prevention (Phase 2)

Manual

Contents

Introduction

This manual accompanies the WRAP Recycling Managers Advanced Training Course – Waste Prevention.

The text within this manual is intended to support the material presented during the course of the module. It highlights key factors and information pertaining to waste prevention and also provides references to further sources of information on the subject.

Throughout this manual there are Action Points, which are also provided in your Workbook, integrated within the text, which are provided to stimulate critical analysis and deeper understanding of the subject. Some of these action points will be discussed during the residential component of the course, others are provided to provoke evaluation of the text / topic. These Action Points formulate a series of questions and discussions which are linked to your course assignment, and should be completed as each of the subjects are covered during the training day.

To support you, there are a series of Additional Resources which are found on the Course VLE pages. Each of the Additional resources is numbered for your convenience.

1. Review of Defra Waste Strategy, for England, 2007

1.1   Progress since Waste Strategy 2000

Since the waste strategy in 2000, England has made significant progress. Recycling and composting of waste has nearly quadrupled since 1996-97, achieving 27% in 2005-06. The recycling of packaging waste has increased from 27% to 56% since 1998. Less waste is being landfilled, with a 9% fall between 2000-01 and 2004-05. Waste growth is also being reduced with municipal waste growing much less quickly than the economy at 0.5% per year.

This progress has been driven by significant changes in policy. The landfill tax escalator and the introduction of the Landfill Allowance Trading Scheme (LATS) has created sharp incentives to divert waste from landfill. Additional funding for local authorities, including through the private finance initiative, has led to a major increase in kerbside recycling facilities and new waste treatment facilities. European directives are targeting sectors, including vehicles, electrical and electronic equipment and packaging. New delivery arrangements have helped to drive the strategy, including the Waste Implementation Programme (WIP), the Waste and Resources Action Programme (WRAP) and the Business Resource Efficiency and Waste (BREW) programme.

1.2   New Vision – producer and consumer responsibility

Despite major progress since 2000, England's performance on waste still lags behind many European countries. All parts of society will have to share responsibility:

- **producers** will have to make products using more recycled materials and less newly extracted raw materials. They will have to design products that are less wasteful and take responsibility for the environmental impact of their products throughout their life;

- **retailers** will have to reduce packaging, source and market products that are less wasteful, and help their consumers to be less wasteful;

- **consumers** – both business and individual households – will have the opportunity to reduce their own waste, purchase products and services that generate less waste and reduce environmental impacts, and separate their waste for recycling;

- **local authorities** will have to commission or provide convenient recycling services for their residents and commercial customers and advice and information on how to reduce waste. They will also have to work with their communities to plan and invest in new collection and reprocessing facilities; and

- **the waste management industry** will have to invest in facilities to recycle and recover waste, and provide convenient waste services to their customers to recycle and recover their waste.

1.3   Objectives and Targets

The Government's key objectives are to:

- decouple waste growth (in all sectors) from economic growth and put more emphasis on waste **prevention and re-use**;
- meet and exceed the **Landfill Directive diversion targets** for biodegradable municipal waste in 2010, 2013 and 2020;
- increase diversion from landfill of **non-municipal waste** and secure better integration of treatment for municipal and non-municipal waste;
- secure the **investment in infrastructure** needed to divert waste from landfill and for the management of hazardous waste; and
- get the most environmental benefit from that investment, through increased **recycling of resources and recovery of energy** from residual waste using a mix of technologies.

The overall impact of this strategy is expected to be an annual net reduction in global greenhouse gas emissions from waste management of at least **9.3 million tonnes of carbon dioxide equivalent per year compared to 2006 (equivalent to annual use of around 3 million cars).**

A greater focus on waste prevention will be recognised through **a new target to reduce the amount of household waste not re-used, recycled or composted** from over 22.2 million tones in 2000 by **29% to 15.8 million tonnes in 2010 with an aspiration to reduce it to 12.2 million tonnes in 2020 – a reduction of 45%**. This is equivalent to a fall of 50% per person (from 450 kg per person in 2000 to 225 kg in 2020).

Higher national targets than in 2000 have been set for:

- recycling and composting of household waste – at least 40% by 2010, 45% by 2015 and 50% by 2020; and
- **recovery of municipal waste** – 53% by 2010, 67% by 2015 and 75% by 2020.

The Government will shortly be setting a new national target for the reduction of commercial and industrial waste going to landfill. On the basis of the policies set out in Waste Strategy for England 2007, levels of **commercial and industrial waste landfilled are expected to fall by 20% by 2010 compared to 2004**.

1.4   Key proposals for action

The main elements of the new strategy are to:

- incentivise efforts to reduce, re-use, recycle waste and recover energy from waste;
- reform regulation to drive the reduction of waste and diversion from landfill while reducing costs to compliant businesses and the regulator;
- target action on materials, products and sectors with the greatest scope for improving environmental and economic outcomes;
- stimulate investment in collection, recycling and recovery infrastructure, and markets for recovered materials that will maximise the value of materials and energy recovered; and
- improve national, regional and local governance, with a clearer performance and institutional framework to deliver better coordinated action and services on the ground.

1.5   Incentives

The aim is to create incentives that reflect the waste hierarchy and create opportunities for the reduction, re-use, and recycling of waste, and recovery of energy from waste. The Government is therefore increasing the **landfill tax escalator** so that the standard rate of tax will increase by £8 per year from 2008 until at least 2010/2011 to give greater financial incentives to businesses to reduce, re-use and recycle waste (from £24 now to £48 in 2010).

It is consulting on removing the ban on local authorities introducing **household financial incentives for waste reduction and recycling**, through early legislative change. **Local government** would be free to introduce schemes where householders who recycle their waste receive payments funded by householders who do not recycle. All schemes would have to be revenue neutral. Schemes would not result in any overall increase in costs. The behaviour change created by the schemes would reduce the amount of waste to be disposed of, generating cost savings. Removing the ban would bring England in line with most other European countries and could reduce the amount of annual residual waste landfilled by up to 15% – equivalent to 1.5 million tonnes or 130kg per household.

1.6   Producer responsibility

Arrangements (both statutory and voluntary) place responsibility on businesses for the environmental impact of products they place on the market, while wider sectoral agreements can cover a range of product and material impacts. In addition to proposals for statutory higher packaging recycling targets, the Government is seeking further voluntary action, but is prepared to regulate if this does not deliver. It is introducing measures to:

■ **reduce excess packaging**, for example by setting optimal packaging standards for a product class;
■ support development of a joint protocol to ensure that local government and industry both identify the best systems for cost effective collection of packaging waste;
■ **develop an opt-out for unaddressed mail** with the Direct Marketing Association alongside delivery of their action on addressed mail, to reduce the amount of unwanted direct mail (of the 16 billion items delivered annually); and **explore the scope for an opt-in mechanism**; and
■ **extend WRAP's Courtauld Commitment** to non-food retailers to increase the total commitments by retailers to reductions in packaging, food and other post-consumer waste.

1.7   Culture change

Changing how we deal with our waste requires action by all of us as individuals – consumers, householders and at work and leisure. Many people are already participating actively in recycling. The Government will build on this to stimulate further action by both individuals and businesses so that changed behaviour is embedded across all aspects of our lives by:

■ extending the **campaigns** for recycling to awareness and action on reducing waste;
■ incentivising excellence in sustainable waste management through a **zero waste places** initiative to develop innovative and exemplary practice;
■ helping third sector organisations to win a larger share of local authority contract work, as well making greater use of **third sector expertise**, particularly to prevent waste, raise awareness, segregate waste at source, and increase re-use and recycling of waste through capacity-building support;

- reducing single use **shopping bags** through a retailer commitment to a programme of action to reduce the environmental impact of carrier bags by 25% by the end of 2008; and
- placing greater emphasis on promoting the **reduction of waste and increase of recycling in schools** by working with DfES and other partners to help schools overcome barriers, issuing new guidance and the use of award schemes (such as Eco-Schools).

1.8   Increasing Resource Efficiency

1.8.1 Challenges and barriers

Despite some recent reduction in the rate of its growth, waste is continuing to increase. Design of many products and their packaging for sale and transport does not place enough emphasis on reducing waste or on limiting landfill from disposal. Many businesses are failing to realise the economic benefits of resource efficiency. Implementation of a number of specific European directives and voluntary agreements secured in some sectors have encouraged recycling, but producer responsibility by business has not sufficiently targeted waste reduction nor reached all the key waste streams.

1.8.2 Where does England need to be?

Significant further reductions in waste growth and use of landfill. Improved design of products and use of materials to increase resource efficiency and reduce waste. Clear strategies and targets to reduce waste and reduce landfill in each of the key waste materials, through producer responsibility agreements with the relevant sectors that can be effectively monitored. Agreed solutions formulated by reference to the environmental costs and benefits relevant to the specific waste materials and sectors concerned.

1.8.3 Some new Key Policies and Action

Strategies need to link policies based upon sound evidence with a corresponding expectancy of action. New polices and their actions are in Table 1.1. These have a part to play in a waste prevention driven set of outcomes.

Table 1.1: Some new Key Policies and Actions

Focusing action on **key waste materials** with greatest scope for improving environmental and economic outcomes (paper, food and garden, aluminium, glass, plastics, wood and textiles)
Establishing with the **paper industry** an agreement with challenging targets to **reduce paper waste and increase paper recycling** incorporating and developing existing agreements for newspapers, magazines and direct mail but extended to office paper, free newspapers, catalogues and directories. And proposals (subject to further analysis) for **higher packaging recycling targets** beyond the 2008 European targets to increase recycling
Establishing a **new products and materials unit within Defra** to identify and catalyse actions across the supply chain, to improve the environmental performance of products across their life cycle; with a **progress report on delivery** in Spring 2008
Implementing measures under the **Eco-design of Energy Using Products** (EuP) Framework Directive will consider the **waste impacts** (along with other environmental impacts) of energy-using products resulting from their manufacture (processes and **materials used**), usage (energy/water consumption and emissions) and **disposal (waste generation)**

Encouraging **re-use and re-manufacture** of products and material resources with support from the Business Resource Efficiency and Waste (BREW) programme
Reducing excess packaging, for example by **setting optimal packaging standards for a product class**
Developing an opt-out for unaddressed mail with the Direct Marketing Association alongside delivery of their action on addressed mail, to **reduce the amount of unwanted direct mail** (of the 16 billion items delivered annually) and **explore the scope for an opt in scheme**
Extending the Courtauld Commitment to **non-food retailers** to increase the total commitments by retailers to **reductions in packaging, food and other post-consumer waste**
Putting in place a **statutory producer responsibility system for managing waste batteries** by September 2008, in line with the EU Batteries Directive

1.9   Some Key New Targets and Actions

The strategy needs to be driven forward by stronger national governance alongside strengthened stakeholder involvement. Success needs to be tracked and for this to happen there need to be key new targets and actions (Table 1.2). A new target that looks at household waste reduction is a major step forward in measurement of waste prevention. This can be used to help drive campaigns that report back to the public.

Table 1.2: Some Key New Targets and Actions

Establishing a **Waste Strategy Board** to provide leadership within and across Government with **responsibility for taking forward the delivery of this strategy and developing new policy actions** as necessary; and a **Waste Stakeholder Group** to provide external advice, challenge and assistance with delivery
Reducing greenhouse gas emissions from waste management by at least 9.3 million tonnes carbon dioxide equivalent per year by 2020 compared to 2006/07
Setting a **new target to reduce the amount of household waste not re-used, recycled or composted** from over 22.2 million tonnes in 2000 and 18.6 million tonnes in 2005 to 15.8 million tonnes in 2010 with an aspiration to reduce it to 14.3 million tonnes in 2015 and 12.2 million tonnes in 2020 – a reduction of 45% between 2000 and 2020
Setting **higher national targets for re-use, recycling and composting of household waste** – at least 40% by 2010, 45% by 2015 and 50% by 2020
Setting national targets for the **recovery of municipal waste** – 53% by 2010, 67% by 2015 and 75% by 2020
Expecting the reduction of **commercial and industrial waste going to landfill** by at least 20% by 2010 compared to 2004
Considering in conjunction with the construction industry, a target to halve the amount of **construction, demolition and excavation wastes going to landfill by 2012** as a result of waste reduction, re-use and recycling
Further developing the **evidence base** to underpin the evaluation and development of future policies and **review of the strategy**

1.10   Some Measures contributing to Waste Prevention

Policies designed to influence public behaviour through the life cycle can impact at the very top of the waste hierarchy, so driving prevention rather than just recycling. Some of the main measures in the strategy that can drive waste prevention are in Table 1.3.

Table 1.3: Some Measures contributing to waste prevention

Landfill Allowance Trading Scheme (LATS):   Provides an incentive for councils to encourage waste prevention in their area in order to reduce amount of waste needing to be diverted from landfill and reduce costs of treatment
Allowing councils to incentivise recycling including through household financial incentives: For waste that cannot easily be re-used or recycled this provides an incentive for the householder to reduce waste
Performance indicators for councils: Indicators which focus on waste prevention provide an incentive for councils to address this issue, including local area agreements
Landfill tax escalator: For waste that cannot easily be re-used, recycled or recovered this provides an incentive for businesses to reduce waste
Material- or sector-based voluntary agreements: Can include specific agreements on waste reduction (as with Courtauld Commitment on packaging and food waste); agreements on recycling provide indirect incentive on waste prevention for waste that is relatively expensive to recycle
Government waste management and product procurement targets: By including targets for waste prevention; recycling targets provide indirect stimulus to waste prevention for waste that is relatively expensive to recycle; recycled content requirements stimulate recycling market
Guidance and awareness measures, including through more visible recycling facilities in public places, activities with schools and use of voluntary sector: These will encourage waste prevention, including through stressing resulting economic gains and through behaviour change

1.11 High level Implementation Plan

Waste Strategy 2007 has identified a range of actions that associated with its objectives (Table 1.4). These cover specific issues and the action has been deigned to address these. Importantly, The Government has realised that action must take place within a given timeframe and be the overall responsibility of one or more designated organisations.

The aim of the action plan is to increase resource efficiency by targeting materials, products and sectors. It also reassures the public that waste prevention is taken seriously and is not just an aspiration with no organization responsible.

Table 1.4: Some components from the High Level Implementation Plan for Resource Efficiency

Issue and Actions	Timeframe	Responsible
39. Engaging business on resource efficiency: Develop Resource Efficiency Appraisal and Development (READ) tool to help businesses appraise their resources management and improve performance	April 2008 (first phase)	Environment Agency
40. Packaging : Amend producer responsibility regulations to achieve packaging minimisation including setting optimal packaging standards for a product class	By 2009	Government/ WRAP

41. Batteries: Establish a statutory producer responsibility system for managing waste batteries; transpose EU Batteries and Accumulators Directive	By September 2008	Government
42. Direct mail: Develop an opt-out service for unaddressed direct mail, and explore the scope for an opt-in scheme for unaddressed mail	By end 2007	Government/ Direct Mailing Association
46. Recruit non-food retailers to Courtauld Commitment	2007 onwards	WRAP

1.12 The future: A step change in waste management.

The need for waste prevention as we move away from Landfill.

The Defra position is: The Government will consult, subject to further analysis, on the introduction of further restrictions on the landfilling of biodegradable wastes and recyclable materials.

What is the reasoning behind this?

We are committed to continuing to reduce our reliance on landfill and minimising the impact landfill has on the environment including greenhouse gas emissions. **Landfill should become the home of last resort for waste**. The Government recognises that landfill may continue to have a place for disposal of some wastes, such as some hazardous wastes and as a means of restoring exhausted minerals workings.

Experience from other European countries is that imposing legal restrictions on the types of waste that can be landfilled has encouraged higher rates of recycling and recovery.

- Austria: Additional restrictions on landfill (2004)
- Denmark: Ban on combustible wastes suitable for incineration (1997)
- France: Ban on landfilling non-residual wastes (2002)
- Germany: Ban on non-treated wastes to landfill (1993); ban on combustible waste to landfill (2001)
- Netherlands: Ban on all wastes that can be reused or recovered (1995)
- Sweden: Ban on non-treated municipal solid wastes to landfill (1996); ban on combustible wastes to   landfill (2002); ban on organic wastes to landfill (2005).

Does this go beyond what the Landfill Directive requires?
Reduction in the negative effects of landfilling of wastes is a main objective of the Directive as well as in line with the waste hierarchy. Further restrictions would be designed to deliver more environmental benefits.

Will industry have time to adjust to further restrictions?
We are still exploring the impact further bans might have and will do so in further full consultation with affected parties. We will want to ensure that environmentally sound alternative recovery and disposal routes are available by the time any further restrictions are introduced.

The environmental benefits of diverting waste from landfill
Landfill has been identified as the worst option for waste management, as it is a waste of valuable resources - and methane from biodegradable waste decomposing in landfills is a

potent greenhouse gas. Methane from landfills accounts for 40% of UK methane emissions. Methane is 23 times as powerful a greenhouse gas as carbon dioxide.

Restrictions on landfill already agreed under the Landfill Directive
The Landfill Directive sets targets for reducing biodegradable municipal waste to landfill. Other restrictions on landfill already implemented or to be implemented under the Directive include:

- categorisation of all landfills as either hazardous, non-hazardous or inert
- end to the practice of co-disposal (where hazardous and non-hazardous wastes are disposed of in the same landfill)
- pre-treatment of hazardous waste going to landfill
- introduction of the waste acceptance criteria for hazardous wastes
- ban on the landfill of used whole and shredded tyres

Further changes being/to be implemented by the Government and the Environment Agency include:

- ban on the landfilling of liquid waste from 30 October 2007
- requirement for the pre-treatment of non-hazardous waste from 30 October 2007
- completion of the re-permitting of existing landfills under the Pollution Prevention and Control regime during 2007 and the closure of remaining landfills that are unable to meet the Landfill Directive requirements by 2009.

2. Introduction to Waste Prevention

2.1   The Waste Hierarchy

It is widely accepted that as a society we need to move away from landfill as an "end-of pipe" solution for the management of waste and progress towards treating waste in a more proactive and sustainable manner.

Enshrined in European and UK law through Waste Framework Directive 91/156/EEC, the waste hierarchy (Figure 2.1) sets out the main options for the management of wastes, in particular solid waste. It is a primary tool along with Proximity Principle and Life Cycle Analysis (LCA).

For the hierarchy the options are presented on a sliding scale with the most sustainable options first (minimisation) and the least sustainable option last (disposal).

Figure 2.1: The Steps in the Waste Hierarchy

MOST DESIRABLE

Minimisation

Reuse
Returnable
bottles
Product Repair

Recovery
Recycling
Composting
Energy
Control of CFC's
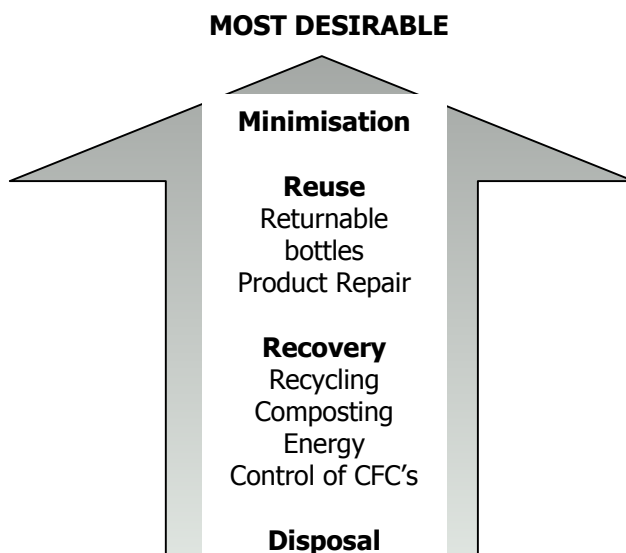
Disposal

2.1.1 Minimisation ("an ounce of minimisation is worth a pound of cure")

Waste that is not created in the first place does not need to be reused, recycled or disposed of, and is therefore the most environmentally desirable option.

2.1.2 Re-use

If you can't prevent the waste in the first instance, how can it be reused? There are many schemes that reuse or refurbish goods like washing machines, furniture, plastic bags and wood.

Imagination and innovation is required, remember do not be restricted to the continuous re-use of a material for its original purpose. For example, much ingenuity has been seen in the re-use of materials for packaging, using shredded paper and cardboard as a packaging material is one such example, thus extending the useful life of the paper/cardboard and reducing the cost of buying in specific packaging materials. Several initiatives have been started within many local authorities to promote re-use in a range of material streams such as unwanted clothes etc.

2.1.3 Recover (Recycling)

Recycling involves the recovery of materials for use in another product. The process of recycling includes the segregation and collection of waste, as well as the physical recycling itself. The term also encompasses composting

Items or materials must be considered discarded and available for disposal in order to be recycled, therefore the item or material is legally classified as waste. Although often conducted via a third-party collection agent, recycling can be conducted in-house or through a direct relationship with a re-processor. Recycling campaigns have been vigorously pursued for the UK for a fair number of years for MSW with increasing degrees of success, it has been a slow process.

2.1.4 Disposal

Only if waste cannot be prevented, reclaimed or recovered, should it be disposed of by landfilling, and this should only be undertaken in a controlled manner.

2.1.5 Using the Waste Hierarchy

The hierarchy is a guide. It does not mean that in all circumstances, at all times, a higher option will be better than a lower option. In most cases a combination of options for managing the different wastes produced at home and at work will be needed. But the hierarchy provides a simple rule of thumb guide to the relative environmental benefits of different options.

The problem we have today is that most of our waste is dealt with towards the bottom end of the hierarchy rather than the top. The challenge is to change our attitudes and our practices so that much more of our waste is dealt with by options towards the top of the hierarchy.

2.2   Waste Minimisation Campaigns

Waste Minimisation is one of the original eight streams highlighted in the Waste Implementation Programme (Defra, 2005A and 2005B). The Waste Implementation Programme (WIP) responds to some of the strategic measures recommended by the Strategy Unit (SU) report "Waste Not Want Not" published in November 2002, and the Government's Official Response. The remit of the Strategy Unit was to consider action to be taken to help the UK to meet the legally binding targets under Article Five of the EU

Landfill Directive (Defra, 2005A). Key Drivers for waste minimisation are discussed in the next chapters.

Waste minimisation campaigns with public engagement (see **Additional resource 1- Guidelines for public engagement in waste sector**) are designed to aid reduction in municipal solid waste. It was increasing in the order of 2.5 to 3.0% per annum in 2002/2003 (Defra, 2004A and 2004 C). At present, due to a raft of policy developments it is now growing much less quickly than the economy and is at around 0.5% per annum (**Defra, 2007**). Recycling on its own will not reduce waste arisings, even with high recycling rates. The general public need to be made aware of waste minimisation instead of merely segregation of waste and participation in recycling schemes. Future local authority campaigns need to move the agenda forward for sustainable waste management and focus on pro-environmental behaviour (**see Additional resource 2– tackling waste challenge**) and waste minimisation, with a short term aim to slow growth in waste arisings and a long term aim to reduce them, per unit of measurement.

In general the aims of waste minimisation campaigns (see **Additional resource 3 – NRWF on WRAP**) are required to:

■ tackle the question of qualitative waste reduction (Household Hazardous Waste Forum) as well as quantitative waste reduction. There is a need to remove a range of products / substances from the Household waste stream. These include batteries, hazardous chemicals, heavy metals and pharmaceuticals;
■ form new and dynamic partnerships with a range of players so that Demand Side (e.g. Community) measures can be utilised at the same time as Supply Side (e.g. Retailers) measures. Such partnerships can make a significant impact in given areas; and
■ link the municipal solid waste agenda with the highly successful waste minimisation clubs that have made a clear impact on industry and commerce in the last 15 years. The `win win` messages from industrial / commercial clubs can be used to drive the municipal agenda and remind the public that industry and commerce are making their contribution as well.

Defra have produced an international comparison of waste minimisation in Europe (**see Additional resource 4- International Waste Prevention and reduction Practice**)

2.2.1 Key Considerations in Municipal Waste Minimisation Campaigns

Planning, designing, implementing and monitoring waste minimisation strategy is discussed in detail in Chapter 5, 7 and 9. However some key considerations of a waste minimisation strategy are outlined below (**see Additional resource 3**).

1. Aims, Objectives and Targets.
Objectives need to be environmental and social. Targets must be SMART (Simple, Measurable, Achievable, Relevant and have clear Timescales).

2. Legal Issues.
Planning consent and Health and Safety are major considerations.

3. Understanding the Market.
Detailed research is required to plan for local market.

4. Project Organisation.
Will activity be run through a `not for profit` organisation, a private sector business or public / private partnership?

5. Partnerships.
Are all key decision makers and opinion formers part of the project?

6. Management and Staffing.
The project team will need a wide range of skills, from financial control to promotional skills.

7. Premises and Equipment.
If new premises are required, the location and type are very important.

8. Promotion and Marketing
The 5Ps to be considered for marketing a campaign / commodities are: Product, Price, Place, People and Process.

9. Quality, Reliability and Service.
Providing a high quality and reliable service is vital.

10. Cost, Revenues and Financial Support.
Expert advice is required to develop appropriate systems.

11. Measuring Success.
Use Key Performance Indicators (KPIs).

12. Waste Disposal
There may be a wide array of residues to be managed at the end of any process.

You should now address the following action point. Available in your workbook.

Action Point 1.0
Critically analyse the importance of waste minimisation/ prevention in the waste hierarchy.

3. Household waste minimisation

3.1   Definitions

There are many slight variations in the definition of waste minimisation; however the actual specific definition itself should be related to the situation in which it should be applied. At times definitions can emphasise minimisation and / or prevention. An excellent description of difference between the two is found below in the WasteWatch definition. Below are some definitions of waste minimisation / prevention.

3.1.1. Some earlier UK Definitions

Environment Agency

"The reduction of waste at source, by understanding and changing processes to reduce and prevent waste. This is also known as process or resource efficiency. Waste minimisation can include the substitution of less environmentally harmful materials in the production process."

SEPA

"The waste hierarchy prioritises how to deal with waste. The best option is to prevent or reduce waste before it is generated. This is called Waste Minimisation. This is the cheapest and most environmentally sound option."

Egeneration

"Waste Minimisation can be viewed as:
        The reduction of unnecessary resource consumption and the minimisation of the
        amount of materials going to final disposal

In order to:
        Reduce operating costs and
        minimise environmental impacts."

DEFRA

"A systematic approach to reducing wastage at source, i.e. through optimisation of processes and procedures, excluding reuse and recycling off-site."

ENVIROS

"minimising the quantity (weight and volume) and hazardousness of household derived waste generated in a defined community for collection by any party."

3.1.2 Some more recent Definitions

WasteWatch

"Waste prevention aims to reduce the amount, hazardousness or energy content of products or materials before they enter the waste stream."

Vitally they point out that:

"Waste prevention differs from minimisation in that it is before it becomes waste. It includes, avoidance, re-education and reuse."

Local Government Association

"Waste prevention means any action taken before a product or substance becomes a waste leading to lower volume or harmfulness of waste."

York and North Yorkshire partnership

"Waste prevention is limiting the quantities of waste requiring collection and management at the local level."

Anon (Canada)

"Waste prevention means the change in the design, manufacturing, purchase or use of materials or products to reduce their level of toxicity before they becomes MSW. It also refers to the reuse of material and products."

As the term "waste minimisation" encompasses many different aspects of waste management it is often a useful exercise to develop a definition in the context of a waste strategy. One approach taken by the Dee Waste Minimisation Project was to develop a detailed definition which included various waste management terms which could be used interchangeably. They defined waste minimisation as the reduction of all waste to a minimum and used the term to cover all solid, liquid and gaseous materials introduced into the land, water, air and all excess energy used by the companies involved.

3.2   Typical Household Waste Composition

In 1996/97, 84%of municipal waste was disposed of by landfill compared to 75% in 2002/03. Despite this drop in proportion the actual tonnage of landfilled waste increased by 1.3 million tonnes, an average increase of 1% per year. However, the amount landfilled in 2002/03 was about the same as that landfilled in 1999 / 2000 so the great majority of the increase occurred prior to then (Defra, 2004A and 2004 C).

In recent years, there has been a clear improvement. In 2005/06 the proportion of municipal waste produced that was landfilled has declined to 62% and for 4 years in a row the actual tonnage of waste disposed of at landfill has decreased to an estimated 17.8 million tonnes (Defra, 2007).

Credible waste composition statistics are vital in the development of waste strategies, policies and plans. Assumptions made about, for example, biodegradable content of municipal waste can have important implications as they could be used as performance indicators for biowaste reduction targets in the UK.

A large number of local authorities commissioned their own compositional research which is now available (**see Additional resources 5 – Calderdale C drive**)

A typical composition of household waste is demonstrated in Figure 3.1.

You should now address the following action point. Available in your workbook.

Action Point 2.0

a. Think about the various definitions of waste minimisation, and what the terms mean to you and your organisation.

b. Discuss the difference between minimisation and prevention

c. Re-define Waste Minimisation in the context of your waste minimisation strategy.

Fig 3.1
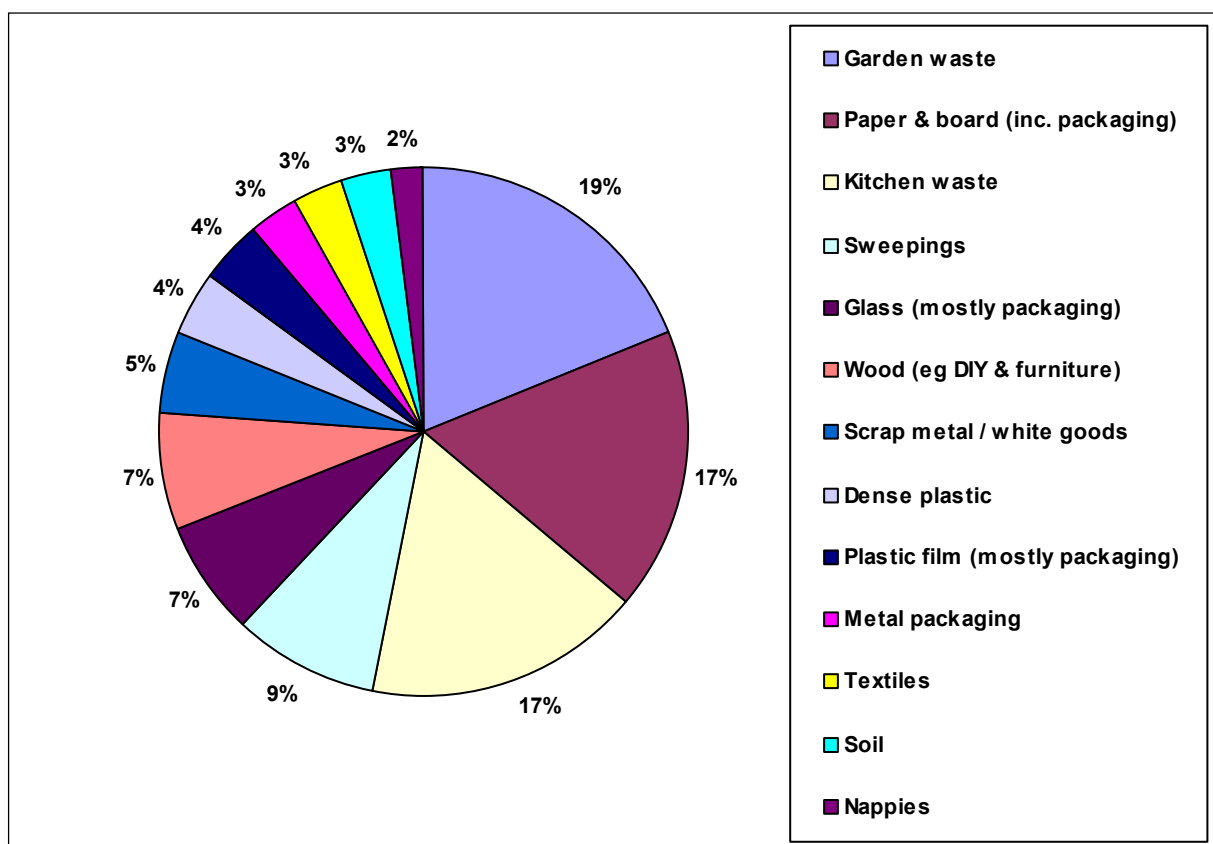
Figure 3.1: Typical Composition of Household Waste (adapted from: Planning for Resource Sustainable Communities, Volume 1: Waste Infrastructure & Management – A Code of Practice, Main Document; Section 7: Sustainable Design Principles – Types & Quantities of Waste and Recyclables Generated from the Development. (Parfitt, J. 2002)

The composition of household waste tends to vary from community to community depending on the socio-economic characteristics of residents and other local factors. Many key components of household waste can be targeted for waste minimisation, see Table 3.1. These components make up around 75% of the waste stream with four categories making up some 15%. These categories represent electrical / electronic items, disposable and single use goods as well as textiles and DIY goods.

Table 3.1: Key Components of Household Waste Targeted for Waste Minimisation (see Additional resource 3)

Waste Type	Approx. % (by weight)
Garden, kitchen waste and soil	39
Packaging (plastic, glass, paper, metal)	24
Paper non - packaging (incl. unwanted mail)	12 (3%)
Other Products	
WEEE / metals	5
Wood (DIY waste and furniture)	7
Textiles	3
Nappies	2-3

While it is essential that the components of the household waste stream are analysed and identified, there is value in understanding the behavioural and influential factors which essentially drive the generation of waste.

3.2.1 Food Waste

Recent research by WRAP has shown that households in the UK throw away 6.7 m tonnes of food waste every year, accounting for a third of all food bought. About 50% of this is edible food. Waste food accounts for about 19% of all UK household waste. In economic terms, a typical household throws away each week between £4.80 and £7.70 of food that could have been eaten. This is between £250-£400 per annum.

Some 30% of households are `high food wasters`, 27% are `medium food wasters` and 43% are `low food wasters`. Public opinion is that little food is wasted and other research has shown that 90% of householders think that they dispose of very little food. Most frequently wasted food is: fruit and vegetables (30%), bread and cakes (20%), raw meat and fish (16%) and ready meals (16%).

The reasons for wasted food are increasingly clear in the UK; they include:

- buying too much;
- shopping without a plan;
- buying more perishable food; and
- high sensitivity to hygiene where 1 in 5 householders will not eat food close to its `sell by date`.

Social pressure means that householders have developed a live for today attitude where food waste is rarely considered.

In terms of carbon savings (a means of measuring benefits of waste reduction) it would be possible to make savings estimated to be the same as taking 20% of car off roads if food waste was eliminated (**see Additional Resources 6 – WRAP *Understanding food waste – Research Summary***).

Knowing waste arisings means that partnerships can be developed to devise ways to target given streams. The Food Waste Roundtable – as part of Courtauld Commitment –

brings together retailers, food and drink companies and local authorities to discuss ways to reduce food waste. This Commitment must be a central component for waste minimisation campaigns (**see Additional Resources 7** – ***WRAP the food waste roundtable presentations***).

4. Factors driving household waste increases

4.1   Introduction

The British economy has experienced fifteen years of economic growth since the last recession ended in the autumn of 1992. Between 1996 and say 2004 the level of real national output had grown in excess of 2% each year, leading to a large rise in total real GDP and an increase in average living standards (National Statistics, 2004).

There has been a clear link between growth in GDP and waste generation, both having increases of around 40% in the Organisation for Economic Co-operation and Development (OECD) countries as a whole since 1980 (OECD, 2004). Between 1990 - 2000 municipal waste generation within OECD countries rose not just in absolute terms but also per capita, indicating that population growth is not the only cause of increased waste.

An OECD report entitled "Addressing the Economics of Waste" (2004) highlighted a number of factors, which have contributed to this increase in municipal waste:

- population growth and structure (households comprising of young children and those persons aged 25-64 produce more waste);
- economic growth;
- growing number of households;
- growing urbanisation;
- structure of consumption; and
- socio-culture habits.

If we consider the growth rates in municipal waste within the UK, they were increasing in the early 2000s, on average, faster than the average yearly growth in GDP of 2 to 2.5%. At present, it is some 0.5% per year (Defra, 2007). Parfitt (2002) identified 6 driving factors related to this growth, many of which, it is suggested, are inter-related. These include:

- demographic (declining average household size and growth in rate of new household formation);
- increased consumer spending;
- behavioural change in relation to waste producing activities (food wastage, attitudes towards garden waste, DIY activity etc.);
- transfer of waste from other sectors e.g. the transfer of material from commercial sectors following the introduction of the landfill tax in 1996;
- changes to waste management strategies such as the provision of 240 litre wheeled bins to householders instead of standard plastic sacks and standard dustbin; and
- the introduction of statutory weight based recycling targets that are not material specific.

The Open University has carried out a major household waste survey (**see Additional Resources 8** – **OU factsheet 2**)

They point out, that it is vital to remember that the waste generation rate and composition can vary markedly from house to house in a given collection area depending

upon e.g. lifestyle and number of occupants (see Table 4.1). The best measure of what a household produces over weekly or monthly intervals is the median rather than the average (Table 4.1).

Table 4.1. Average and median household waste generation rates in England (early 2000s)

Average and median waste generation rates				
WASTE CATEGORY	Approximate % of total waste generated	% of sample producing waste category	Average rate of production (kg/hh/wk)	Median rate of production (kg/hh/wk)
Cardboard & paper packaging	5.5%	98.6%	1.4	0.9
Non-packaging paper	10.7%	98.3%	2.7	2.1
Dense plastic packaging	3.0%	97.7%	0.7	0.6
Miscellaneous plastic	2.1%	95.3%	0.6	0.3
Ferrous packaging	2.0%	93.5%	0.5	0.3
Aluminium packaging	1.0%	92.7%	0.3	0.1
Miscellaneous metal	2.0%	41.0%	1.2	0.2
Glass packaging	6.9%	96.6%	1.8	1.3
Textiles	1.7%	68.0%	0.6	0.3
Putrescible kitchen waste	12.6%	97.5%	3.2	2.6
Garden waste	22.0%	71.3%	7.6	2.9
Sanitary wastes	2.3%	13.4%	4.2	3.9
Misc. combustible waste	4.4%	57.3%	1.9	0.4
Misc. non-combustible waste	22.3%	51.8%	10.6	0.2
Fines	1.3%	53.9%	0.6	0.2
TOTAL WASTES	100.0%	100.0%	24.6	14.8
Source: Open University Household Waste Study (see Additional Resources 8)				

They also find that there are many variables that affect waste generation (see Table 4.2). One of the most important of these is the age range of occupants. For example, over 60s produce less aluminium package waste but on the other hand they had more textile and non-package waste per unit of measurement.

Table 4.2 Some of the factors found to affect household waste generation rates in England

Some of the factors found to affect waste generation rates	
Cardboard & paper packaging	Household size, pet ownership
Non-packaging paper	Age profile
Dense plastic packaging	Household size, pet ownership
Miscellaneous plastic	Household size
Ferrous packaging	Household size, pet ownership
Aluminium packaging	Household size, age profile, pet ownership

Miscellaneous metal	Age profile
Glass packaging	Household size
Textiles	Age profile
Putrescible kitchen waste	Household size,
Garden waste	Dwelling type, owner- occupation
Sanitary wastes	Presence of infant children
Miscellaneous combustible waste	Household size
Miscellaneous non-combustible waste	Owner- occupation
Fines	Use of solid fuel, Dwelling type
Source: Open University Household Waste Study (see Additional resource 8)	

4.2   The Social Context

In today's society, households have changed their eating habits in order to cope with life/work balances, changing tastes and leisure patterns. There is a marked increase in consumer spending on the use of convenience foods and leisure activities. Other impacts on changing trends indicate that reuse has become less important (e.g. shoes are increasingly replaced rather than repaired).

4.2.1 Convenience

According to the "British Lifestyles", a report produced by Mintel (www.mintel.com) in 2003, the British worked more hours in the week than any other European nation, which in turn increases the demand for greater convenience and spending in relation to food and drink purchasing and the way we eat. Over £2 billion plus is spent each year on ready meals in the UK with an increase in demand of over 45% between 1998 and 2003 compared to the Europe figure of 29%. This increased use in ready meals has resulted in a greater use of plastics and composite packaging. The convenience factor has also contributed to a disposable culture which affects consumer purchasing habits in areas such as coffee cups, nappies and cameras, and due to the decreasing cost of items there has also been a decline in the reuse and repair of household items (e.g. DVD recorders).

4.2.2 Demographics

The number of single person households has risen dramatically across all age groups. As a result of this there are more households and therefore greater expenditure on items such as household goods e.g. furnishings, electrical appliances, DIY goods etc. Figure 4.1 shows a comparison of the composition (%) of households in 1972 and 2002.
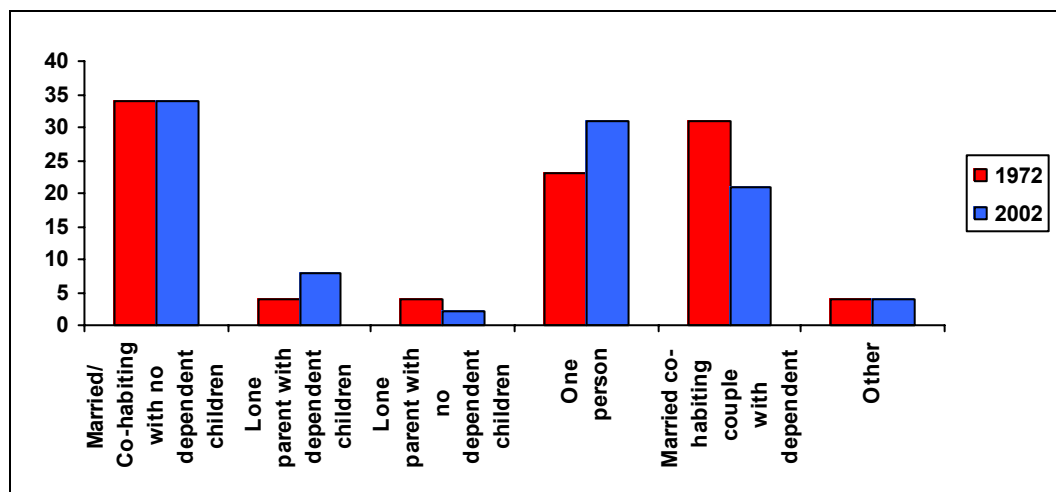
Figure 4.1: Household Composition (%) 1972 and 2002 (Source: National Statistics (2004) Living in Britain 2002*)***

4.2.3 Income and Consumer Spending

Increased wealth, for a majority of UK citizens, has resulted in an increased ability to purchase goods and services. Increased disposable income has led to greater spending (see Figure 4.2) on "luxuries", such as electrical items, luxury foods and gifts and to respond more readily to changes in fashion. Extra disposable income has also led, with our desire for convenience, to the acceptance of disposable goods.

Our society's increased spending will lead to increased amounts of waste and increased emissions. It was estimated in the early 2000s that our household waste `mountain` would double by 2020 if our consumer habits continued as they were (DETR, 2000).
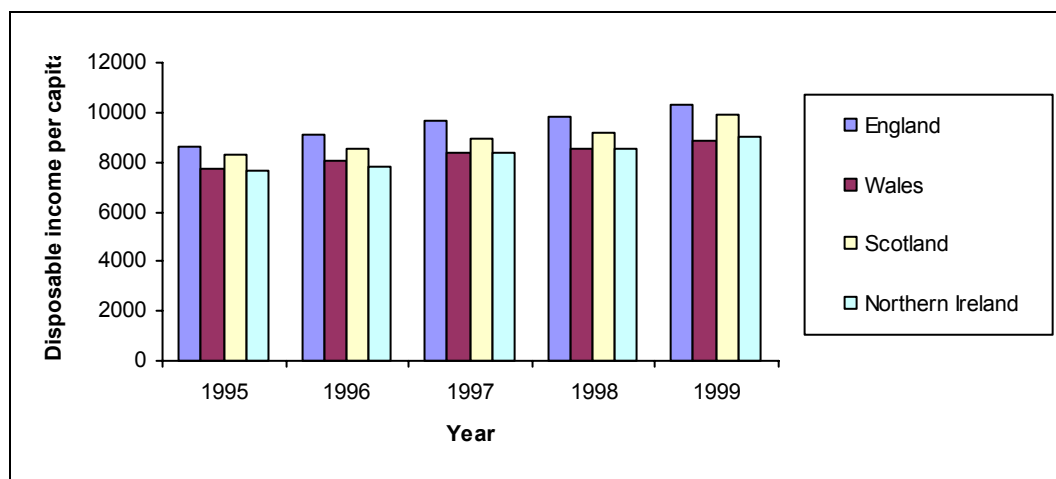
Figure 4.2: Gross Household Disposable Income per Capita (£) (Source: National Statistics (2004) Living in Britain 2002)

You should now address the following action point, available in your workbook.

Action Point 3.0
What influences do you consider will impact on consumer spending and ultimately affect the waste streams in the UK?
Do you consider these influences to be nationwide or would you expect to have localised influences?

4.2.4 Consumer spending: Direct charging for household waste arisings

The Waste Strategy (Defra 2007) seeks to introduce a financial incentive scheme. This will link expenditure (consumer spending) and waste arisings. It is considered, on the basis of European data, that this will result in reduced MSW waste arisings. Public behaviour will be changed, in many cases, by the realisation that they – the public - will have to pay for waste arisings and therefore they will adopt an approach to reduce them.

At present the law currently prohibits authorities from introducing financial incentive schemes to promote recycling and reduction of waste. The strategy proposes to lift this ban to allow local authorities – not Defra - to decide whether or not they wish to introduce a scheme for their area. A consultation has been launched today (24th May, 2007) on removing this ban.

What are financial incentives?

The purpose of financial incentive schemes is to encourage and reward sustainable waste behaviour. They will not be money-raising exercises for local authorities.

The schemes will vary – depending on what each local authority decides to implement. However all are intended to encourage householders to reduce the amount of non-recyclable waste they produce: householders taking steps to recycle/compost and reduce waste overall will receive a rebate from their local authorities. Householders who don't will pay more.

Why would a local authority introduce a financial incentive scheme?

■ local authorities need the flexibility to respond to their waste management challenges with the most appropriate tools;
■ with challenging targets for waste minimisation and recycling in the Strategy; alongside EU targets for a reduction of biodegradable municipal waste sent to landfill, local authorities need residents to reduce their waste, home compost and recycle;
■ financial incentives are one tool that could help authorities to change waste behaviour, and to hence reduce costs and minimise carbon impacts; and
■ the Government's Waste Strategy 2007 aims for annual net reductions in greenhouse gas emissions from waste management.

How much control will Government have over the schemes?

Local authorities will be free to design schemes that best deliver the needs of their communities. However any scheme must meet the following criteria, set out in future legislation:

■ the scheme must have as its aim the promotion of recycling and waste reduction;
■ waste separated for recycling or composting will continue to be collected free of charge (with the exception of garden waste, for which authorities would be free to levy a charge, as at present);

- the scheme must be revenue neutral and must not increase the overall cost to local residents;
- good kerbside recycling facilities must be available to any household covered by a scheme. Local authorities will be required to provide kerbside recycling facilities for at least 5 waste streams (not including garden waste) – for example, paper, glass, cans, plastics and food waste;
- clear communication strategies must be in place to communicate the nature of the scheme to Householders;
- schemes must make provision for the needs of particular groups that could potentially be disadvantaged (e.g. Council Tax benefit recipients, families with young children); and
- schemes must make provision to avoid fly-tipping, littering and illegal disposal of waste.

How might a scheme work?

The Government has put forward one possible model, the "Recycling Incentive":

- householders are billed throughout the year according to the amount of non-recyclable waste they throw away;
- at the end of the year all money raised is returned to residents on a flat-rate basis, i.e. it would be shared between all households on the scheme, with each receiving an equal amount. Local authorities will not keep any money raised directly by the financial incentives;
- those who have produced less non-recycled waste than average will be better off as a result; those that produce more than average will pay more; and
- the change in behaviour created by the scheme would mean less waste to be disposed of, leading to cost savings. This could benefit all residents, by helping reduce pressure on Council Tax, or by freeing up money to be spent on other local services.

There are a range of examples of international schemes that local authorities could use as a model for a financial incentive scheme – some of these are outlined in the consultation document:

- Seattle, USA: Bin Volume-based Scheme. Householders are asked at the beginning of the year to say which sized bin they would like to use. They pay more for a larger bin. If they create more waste than will fit in the bin they can buy special sacks to dispose of it.
- Maastricht, Netherlands: Sack-based scheme. Householders buy special pink sacks from local shops for their non-recyclable waste.
- Flanders, Belgium: Weight-based scheme. Bins are weighed at each collection, and households are billed according to the total amount of non-recyclable waste they throw away.

What are the benefits of financial incentives?

Evidence from existing schemes overseas shows that they can encourage householders to increase recycling/composting, reduce waste overall and therefore lower the costs of waste management. Recent research modelled the potential impact of financial incentives in England in the future and found:

Waste behaviour:

- increase of total national recycling and composting rate from 39% to 44%;
- best types of schemes see local recycling/composting rates rise to 54%; and
- schemes could lead to reductions in the amount of non-recycled waste of between 13 and 39 per cent.

The report looks at the impact of introducing financial incentives across England, but assumes that only 62% of all households are covered by schemes. No households living in high-rise flats are covered, for example.

Costs:

■ financial incentive schemes are estimated to deliver a net national cost saving of £94 million per year with widespread take up; and
■ in some cases cost savings of up to £18 per household could be achieved.

Climate Change:

Defra modelling suggests that with widespread take up, the increased recycling alone would save between 500 thousand and 1 million tonnes carbon dioxide equivalent a year.

4.2.5 Age and Population

In 1971 the proportion of people aged 65 and over was 12%. In 2002, it was 16%. This increase in the proportion of older people in the population corresponds with a marked decrease in proportion of children under the age of 16 from 29% in 1971 to 25% in 2002.

The population is getting older with a higher percentage aged over 50 than ever before and is set to rise from the 20 million in 2000 to 27 million in 2025. The over 50s possess 80% of the UK wealth and 40% of its spending power, worth over £145 billion per year. Retired people have more time and hence may counter the trend towards the need for greater and greater convenience (**see Additional resource 3**).

4.3   Trends of Particular Waste Streams

4.3.1 Garden Waste and Home Composting

Since the early 1990s organic waste has proven to be the single largest component in most waste composition analysis (Table 4.3). The rise in green waste can partly be attributed to societal trends that have made gardening more fashionable (influenced by prime time television shows). Retired people tend to have a lifestyle with more emphasis on leisure, DIY and gardening which in turn generates more green waste. The increase in people over 65 over the last 15 years will have been a contributory factor.

Table 4.3: Estimated Compostable Portion of Household Waste Streams)

Source	% Compostable
Green garden waste	90%
Kitchen waste	50% (excluding animal by-products)
Soil and wood	25%
Paper and cardboard	10%

4.3.2 Unwanted Mail and Newspapers

The impact of ICT (the availability of newspapers on the internet) may be contributing to a general decline in national newspaper sales recorded. While national daily newspaper circulation is in the order of 12 million, the main UK cities distribute copies of Metro to

commuters in the morning which makes this free paper in the region of the 6th most popular daily newspaper.

There has been a significant rise in the number and range of magazines available to consumers with notably a market growth in men's magazines. It is suggested that a significant proportion of these magazines are sold to people undertaking journeys. The issue here can be considered one of disposal; are they being taken home and hence part of household collection or are they entering the commercial waste stream if left on public transport (**see Additional resource 3; NRWF Toolkit**).

The most prolific growing area of waste is that of "junk" mail, having more than doubled in the last 15 years and now reached over 700 000 tonnes of waste per year and contributing to about 3% of the household waste stream (**see Additional resource 3**). Over £70 million a year is spent on sending people who have moved house direct mail. Figure 4.3 shows the proportion of unwanted mail attributed to free newspapers, organisations associated with the householder (e.g. banks), flyers and other mailings.
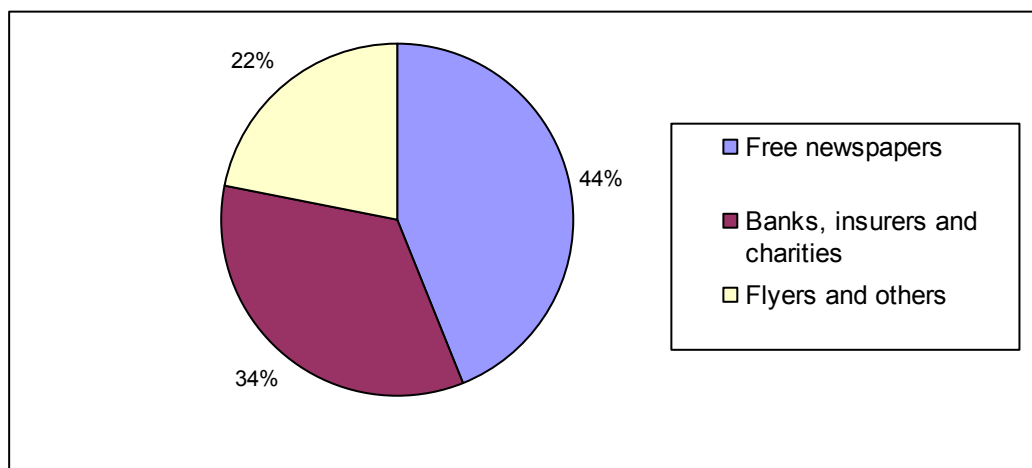
Figure 4.3: Percentage of Junk Mail (adapted from source: NRWF Toolkit (additional resource 3))

The Waste Strategy (Defra, 2007) contains the following new policies on unwanted mail and newspapers:
- government has agreed with the Direct Marketing Association (DMA) that the DMA will develop an opt-out system to enable people to **opt-out of receiving unaddressed mail**. People can already opt-out of receiving addressed mail; and
- government will also be exploring with the DMA whether an **opt in** system would be an appropriate mechanism to further reduce unwanted direct mail. Under this system people would only get junk mail if they opted in by placing their name on the direct mail register.

The existing voluntary agreement

The Direct Marketing Association (DMA), which represents about 900 members involved in the direct mail and promotions industry, signed an agreement with Government in July 2003 to raise recycling levels to:

- 30% by the end of 2005;
- 55% by the end of 2009;
- 70 % by the end of 2013.

The DMA also pledged to:

- work with local authorities to promote collection of DM&P material for recycling;
- increase the use of recycled paper;
- avoid using materials which might cause problems with the recycling process; and
- reduce waste by improving targeting of addressed direct mail and by publicising services such as the Mailing Preference Service (MPS), to enable people to stop receiving addressed direct mail.

Separate voluntary agreements apply to newspapers and magazines.

What progress has been achieved?

In 2003, only about 13% of direct mail was recycled. The DMA has recently estimated that this figure rose to 28% in 2005. However the 28% figure does not take account of direct mail collected for recycling at bring and civic amenity sites. Since 2003, registrations with the Mailing Preference Service have doubled. The amount of addressed direct mail has fallen by about 5%.

Why was this further action on direct mail needed?

Government wishes to see the amount of unnecessary direct mail, and therefore waste, minimised. According to the regulator (Postcomm) unaddressed mail outnumbers addressed mail by 4 to 1. It is also estimated that unaddressed direct mail is increasing by 1-2% a year.

Many responses to a 2006 consultation showed that householders and local authorities felt more action was needed to tackle direct mail. For some householders this constitutes a useful marketing service but others are keen to reduce waste from what is often an unsolicited source.

Why has the Government not banned unwanted 'junk mail' outright?

A voluntary approach allows industry the maximum opportunity to develop ways of increasing recycling and reducing waste together with Government. Progress has been achieved with the existing voluntary agreement and this can be built upon.

Key facts and figures

- Postcomm estimates that 3.4 billion items of addressed direct mail and 13 billion items of unaddressed direct mail were sent out in 2005/6;
- direct mail and promotions material accounts for around 550,000 tonnes of paper: 4.4% of the UK's annual consumption of paper and board;
- direct mail - individually **addressed** advertising messages, which accounts for about **181,500** tonnes;
- **unaddressed** door drops - including advertisements posted by hand; and
- inserts - advertising material in magazines and newspapers, which together account for **368,500** tonnes.

Key source of information:

Defra (2003) Producer responsibility [online], London: Defra. Available from: http://www.defra.gov.uk/environment/waste/topics/paper.htm [accessed 31st October 2007]

4.3.3 Nappies

The UK disposes of around 8 billion disposable nappies each year which represents around 3-4% of collected household waste. One baby alone can use around 5 000-6 000 disposable nappies in the requiring years. This is compared to the 20-40 washable nappies. It has been stated that a 15% change to reusable nappies would save around 0.5% of household waste.

4.3.4 Packaging

The Waste Strategy has a major emphasis on packaging reduction. A key message of the new strategy is that retailers need to do more to reduce packaging, building on existing progress. In addition to proposals for higher statutory packaging waste recycling targets under the existing Regulations, the Government is seeking further action on packaging minimisation.

Why the need to take further action on excess packaging?

Since the introduction of the packaging Regulations, and their recovery and recycling targets, there has been a significant increase in the level of packaging waste recovery, some 20 percentage points since 1999. In 2006, the recycling rate for packaging waste stood at 56% (with overall recovery at 61%). Good progress has been made on recycling, therefore, but more needs to be done on minimisation of packaging in particular.

Development of optimal packaging standards

The Government will, in consultation with the industry, look to amend the producer responsibility regulations to achieve packaging minimisation while keeping in mind businesses' commercial objectives. This would look to get producers to select packaging that is the optimal weight, where there are alternatives. They intend to build **on WRAP's development of 'best in class'** containers so that, for example, producers would be expected to use the lightest weight packaging where such an option exists. WRAP's research has shown that there can be large differences between the amounts of packaging on similar products.

Proposals for higher recycling targets beyond 2008

The European Union has set minimum recovery and recycling (including material-specific recycling) targets up to 2008.   The Packaging Directive targets of 60% recovery and 55% recycling of packaging waste in 2008 are expected to be achieved but even if they are, there is still a significant amount of packaging waste that is not being recycled – nearly 5 million tonnes.
The Government will therefore propose (subject to analysis) higher recycling targets for the period beyond 2008, building on the indicative targets that are already in the packaging Regulations up to 2010 and extending these to 2012. The aim will be to divert more packaging waste from landfill and reduce the greenhouse gas emissions associated with some packaging materials (e.g. aluminium and plastics) in particular.

Joint protocol

To ensure that increasing amounts of packaging materials from the household waste stream are collected for recycling, the Advisory Committee on Packaging and a group of local authority Chief Executives, supported by Defra, are developing a joint protocol to improve their collaborative working. This is intended to help local government and industry identify the best systems for cost-effective collection of packaging waste from households for recycling and improve performance against both sets of targets.

The Courtauld Commitment and packaging waste

Thirteen major retailers, representing 92% of the UK grocery market, have signed up to the Courtauld Commitment to support the delivery of the following targets:

■ to design out packaging waste growth by 2008;
■ to deliver absolute reductions in packaging waste by March 2010; and
■ to identify ways to tackle the problem of food waste.

This translates into the following WRAP business plan targets for 2008. To secure an 80,000 tonne per year reduction in packaging waste and an accumulated 340,000 tonne reduction by 2010.

Several food and drink brands and manufacturers have now also signed up to the Commitment. WRAP is working to encourage other brands to sign up and to extend the agreement to non-food retailers.

The Packaging Directive Targets

The Producer Responsibility Obligations (Packaging Waste) Regulations 2007 (the 'packaging Regulations') and Packaging (Essential Requirements) Regulations 2003 aim to minimise the amount of packaging used in the first place, and therefore reduce packaging waste.   The packaging Regulations also encourage reuse of packaging and aim to increase the recovery and recycling of packaging waste to target levels by the Directive deadline of 31 December 2008.

The Directive targets are:

■ minimum recovery 60%; and
■ recycling 55% - 80%.

Under these, there are material-specific recycling targets which are:

■ glass and paper 60%;
■ metals 50%;
■ plastics 22.5%; and
■ wood 15%.

The Essential Requirements Regulations

The Essential Requirement Regulations place a range of requirements on all packaging placed on the market in the UK including those related to packaging volume and weight. This should be limited to the minimum adequate amount to maintain necessary levels of safety, hygiene and consumer acceptance for the packed product.

Key facts and figures

Packaging waste arisings now total over 10 million tonnes per annum and are predicted by the industry to continue to rise slightly, in line with the recent trend. Growth is mostly in plastic packaging. About 20% of all waste put out by households is retail packaging

4.3.5 Electronic and Electrical Equipment

This has been a significant proportion of the MSW waste stream. Recent legislative changes mean that the WEEE Directive will have a big impact on this stream in the future. This can be used as a component in a waste prevention campaign (Info Box 4.1).

Info Box 4.1
Legislation and EEE

On 13 February 2003, the Waste Electrical and Electronic Equipment Directive (WEEE Directive) and a second piece of legislation, the Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) were printed in the EU official journal, and hence came into force in the EU. Member states will have to have incorporated the legislation into their own statute books by 13th August 2005 unless they sought a deregation. The Directive came into force in England on 2 January 2007 and full producer responsibility on 1 July 2007.

The two pieces of legislation will have a profound effect on how we view and treat waste electronics. The WEEE Directive continues the theme of producer responsibility running through recent waste based European legislation. The premise is that those who produce goods should also be held accountable for their disposal. This in essence means that companies manufacturing and importing electrical products are going to be legally and financially responsible for meeting the targets set in the legislation. During 2007 it was estimated that there are some 900 000 tones of WEEE in the UK from domestic sources. This will reach 1.23 m tonnes by 2010 (Defra, 2007).

Key provisions of the Directive are:
1. The member sates must set up systems for separate collection of WEEE and ensure that at least 4kg of WEEE from private households is collected per inhabitant per year.
2. Producers must set up systems for treatment of WEEE
3. Producers to provide for recovery and re-use of separately collected WEEE with recovery, re-use and recycling targets set as proportion of WEEE collected and ranging from 50-80%.
4. There is no mandatory requirement for householders to separate all WEEE, but Member states must seek to minimise co-disposal and encourage appropriate behaviour.

WEEE applies to all EEE that dependant on electrical currents and electromagnetic fields with voltage not exceeding 1000 volts AC or 1500 volts DC. This covers large and small household appliances.

Producers can join a compliance scheme and there are some 40 in existence in 2007, e.g. Valpak, Servis WEEE and WEEE care.

4.3.6 Understanding European household consumption behaviour

European household consumption has grown continuously alongside GDP in past decades, but has also changed in its form. Household consumption expenditure in the EU-15 between 1990 and 2002 increased by almost one third to more than 12 000 EUR per person per year on average. Expenditure on recreation, culture and dining-out increased by 30 %, transport and communication by 33 % and health by 56 %. Household consumption expenditure by the new Member States in 2002 averaged approximately 2 400 EUR per capita - approximately one fifth of that in the EU-15. Expenditure by the new Member States increased by around one third between 1995 and 2002. The share of recreation, culture and dining-out increased by more than 50 % while that of health more than doubled. Projections show a doubling of total household consumption (in terms of expenditure) in the EU-25 by 2030.

Understanding changes in household consumption patterns is about understanding human behaviour - why we consume, what drives us to behave the way we do and buy specific products and services. Our patterns of consumption are not easy to map as they

are shaped and re-shaped by an array of interdependent social, cultural, political and economic changes in Europe and the world. Understanding changes in household consumption patterns is about understanding human behaviour - why we consume, what drives us to behave the way we do and buy specific products and services.

 Economic and social factors drive household consumption. Income grows year by year, globalisation gives us access to goods from all over the world and we have recently experienced major systemic technological breakthroughs, such as the internet and mobile phones. The projected economic growth of 2.4 % per year in the EU-25 between 2000 and 2030 would be accompanied by a similar growth in consumption.

Households are becoming smaller and are tending to use more energy and water, generating more waste per person. The average number of persons per household in the EU-15 has fallen from 2.8 in 1980 to 2.4 in mid 2000s. The average in the new Member States is 2.5. At the same time, Europe's population is ageing and this will undoubtedly change our consumption patterns. For example, expenditure on personal travel and health is likely to increase, as is the purchase of second homes.

Understanding consumption patterns also means understanding how individuals make choices. At an individual level our consumption patterns are shaped by our needs, abilities and opportunities. Consumption patterns are also shaped by a desire to identify with groups that define themselves in a variety of ways. An important factor that shapes our opportunity to consume is the goods and services supplied by the producers and how these are advertised. Recently, we have seen signs that advertising and targeted marketing have become more advanced - for example through product placement in films - perhaps influencing both our needs and opportunities more than we are aware.

Key source if Information
EEA (2005) Household consumption and the environment (EEA Report No 11/2005) [online] Copenhagen: EEA. Available from: http://reports.eea.eu.int/eea_report_2005_11/en/EEA_report_11_2005.pdf [accessed 31st October 2007]

4.4   Conclusions

Due to the wide variety of influences on the consumer it is hard to predict where the composition of the household waste stream is going over the next ten years or so. It is suggested that the situation will be driven by many factors including the following:

- more disposable income;
- more single households;
- ageing population;
- fashion trends;
- "convenience-led" lifestyle; and
- others.

To reduce waste arisings we need to consider how policy makers can bring about public behaviour change to tackle the waste challenge (**see Additional resource 9** – DEFRA Promoting Pro-environmental behaviour)

You should now address the following action point, available in your workbook.

Action Point 4.0
Identify the drivers for household waste increases in your area.
Critically analyse the potential for waste minimisation for individual waste streams.

5. Waste Prevention Strategies and Targets

5.1   Introduction

It is vital when considering the development of a waste minimisation strategy to be aware of all legislation and policy which will influence targets.

Over the past years a number of legislation based drivers have been introduced into the UK:

- The Biodegradable Municipal Waste (BMW) targets of the Landfill Directive (99/31/EC) (implemented July 2001)
- The EU Targets under the 5th (1993-2000) and 6th (2001-2010) Environmental Action Programmes (see Info Box 5.1)
- The UK complies with EC Directive (94/62) on Packaging and Packaging Waste which requires Member States to achieve recovery targets of between 50% and 65% annually from 2001. The UK has implemented this Directive by introducing the Producer Responsibility Obligations (Packaging Waste) Regulations 1997 (as amended) and the Packaging (Essential Requirements) Regulations 1998
- National Waste Strategy Targets (England, Northern Ireland, Wales and Scotland) e.g. Defra 2007.
- Best Value Performance Indicators for Local Authorities with regards to collected waste tonnages per head
- Waste Minimisation Act (1998)

In the following section some of these relevant frameworks and strategies will be discussed in relation to waste minimisation.

> Info Box 5.1
> **European Targets**
> 5th Environmental Action Programme (EAP) set targets for the EU to achieve waste levels of no more than 300kg per person. The European Environment Agency (EEA) notes kg / capita waste arising figures for UK at 400kg (1996), and around 512kg for 2000.
>
> Waste Minimisation is one of the four priorities for the 6th EAP (2001-2010). An objective has been set to reduce the quantity of waste going to final disposal by around 20% of 2000 levels by 2010 and in the order of 50% by 2050.

5.2   European Policy

The EC Framework Directive on Waste (74/442/EEC as amended by 91/156/EEC) sets the overall policy context for waste management and disposal in Member States. The overriding policy objective is in Article 4:

'To ensure that waste is recovered or disposed of without endangering human health and without using processes or methods which could harm the environment and in particular without:

- risk to water, air, soil, plants or animals; or
- causing nuisance through noise or odours; or
- adversely affecting the countryside or places of special interest'.

An important legislation based driver has been the Landfill Directive with targets for the diversion of BMW from landfill. The targets relate to diversion relative to baseline 1995 data. Given that an estimated 70% of all UK household waste is BMW, anything related to the reduction in growth or stabilisation of these waste arisings has a huge impact.

The Landfill Directive (Directive 1999/31/EC) requires that:

- member States establish strategies for the reduction of biodegradable waste in order to meet Directive targets;
- the cost of landfill is covered by disposal charges levied against users;
- procedures should be implemented to cover the closure and after-care of landfill sites; and
- existing landfills should either conform to the terms of the Directive or be closed down.

The Directive sets targets requiring a staged reduction in the amount of biodegradable waste going to landfill, so that by 2020 the volume of waste is reduced to 35% of the 1995 amount. In the early 2000s, about 75% of municipal waste was landfilled in England and Wales (Defra, 2004C). Since then less waste is being landfilled with a 9% fall between 2000/1 and 2004/5 (Defra, 2007) and was around 62% for 2005/2006.

The Directive also requires that each landfill site be given one of the following classifications:

- Landfill for hazardous waste
- Landfill for non-hazardous waste
- Landfill for inert waste.

Producer Responsibility' is an example of the extended version of the Polluter Pays Principle as it applies to waste and resource management. It can be generally defined as the principle that places responsibility for the environmental impact associated with a product onto the producers of that product. Producer Responsibility is intended to address cradle to grave environmental problems from initial minimisation of resource use, through extended product life span, to recovery and recycling of products once they have been disposed of as waste.

Producer Responsibility is increasingly used throughout the world as a means of addressing environmental impacts of certain products. The EC and the UK have applied producer responsibility to packaging, vehicles and electrical/ electronic products and are likely to apply it to other products in the future. Producer responsibility legislation which is also of relevance is:

- Waste Electrical and Electronic Equipment (WEEE) Directive
- Restriction of Hazardous Substances (RoHS) Directive

In addition to these there is the proposed EU directive on the end use of electrical equipment which takes in the eco-design approach.

A EU white paper on Integrated Product Policy (IPP) addresses the entire life-cycle approach of production and consumption. This concept is based on a numerous

instruments such as labelling, eco-design, product standards, greening of public procurement and product related taxes.

5.3   Proposal for a Directive of the European Parliament and the Council on waste

A recent consultation paper by Defra in 2006 on waste prevention for the EU has provided some interesting comments. The position is still unclear whether in the UK we should move towards waste prevention programmes as Europe are suggesting we consider.

5.3.1 Waste Prevention Programmes: The Defra position in their Consultation Paper

5.3.1 Articles 29-31 of the revised WFD require Member States to draw up waste prevention programmes and set down the conditions under which the programmes are to be developed. Article 30(1) requires Member States' waste prevention programmes to set waste prevention objectives and Member States must assess the opportunities for taking the measures set out in Annex IV to the revised WFD. These objectives and measures must be designed to break the link between economic growth and the environmental impacts associated with the generation of waste. Article 30(2) requires Member States to determine specific qualitative and quantitative targets and indicators for any measure or combination of measures adopted. Annex IV to the revised WFD sets out **16** measures which Member States must assess in drawing up their waste prevention programmes. The full list of measures is below. The Government say:

"The Government endorses the increased emphasis which the revised WFD places on waste prevention and agrees with the Commission's view that setting standards is very difficult in this complex area – but considers that flexibility is needed on this issue to take account of national and local conditions.

The Government is concerned about the scope and content of the Commission's proposals on waste prevention programmes and their requirements resulting in the imposition of administrative burdens and costs without a commensurate benefit in terms of waste prevention and meaningful measurement of progress in waste prevention.

It is also the Government's view that a requirement to assess the usefulness of economic instruments30 is inconsistent with the subsidiary principle; and that it is the responsibility of individual Member States to decide on economic instruments to encourage sustainable waste management."

5.3.2 Annex iv: Waste Prevention measures

(i). Measures that can affect the framework conditions related to the generation of waste

1. The use of planning measures, or other economic instruments affecting the availability and price of primary resources.

2. The promotion of research and development into the area of achieving cleaner and less wasteful products and technologies and the dissemination and use of the results of such research and development.

3. The development of effective and meaningful indicators of the environmental pressures associated with the generation of waste at all levels, from product comparisons through action by local authorities to national measures.

(ii). Measures that can affect the design and production phase

4. The promotion of eco-design (the systematic integration of environmental aspects into product design with the aim to improve the environmental performance of the product throughout its whole life cycle).

5. The provision of information on waste prevention techniques with a view to facilitating the implementation of Best Available Techniques by industry.

6. Organise training of competent authorities as regards the insertion of waste prevention requirements in permits under this Directive and Directive 96/61/EC.

7. The inclusion of measures to prevent waste production at installations not falling under Directive 96/61/EC. Where appropriate, such measures could include waste prevention assessments or plans.

8. The use of awareness campaigns or the provision of financial, decision making or other support to businesses. Such measures are likely to be particularly effective where they are aimed at, and adapted to, small and medium sized enterprises and work through established business networks.

9. The use of voluntary agreements, consumer/producer panels or sectoral negotiations in order that the relevant businesses or industrial sectors set
their own waste prevention plans or objectives or correct wasteful products or packaging.

10. The promotion of creditable environmental management systems, including ISO 14001.

(iii). Measures that can affect the consumption and use phase

11. Economic instruments such as incentives for clean purchases or the institution of an obligatory payment by consumers for a given article or element of packaging that would otherwise be provided free of charge.

12. The use of awareness campaigns and information provision directed at the general public or a specific set of consumers.

13. The promotion of creditable eco-labels.

14. Agreements with industry, such as the use of product panels such as those being carried out within the framework of Integrated Product Policies or with retailers on the availability of waste prevention information and products with a lower environmental impact.

15. In the context of public and corporate procurement, the integration of environmental and waste prevention criteria into calls for tenders and contracts, in line with the Handbook on environmental public procurement published by the Commission on 29 October 2004.

16. The promotion of the reuse and/or repair of appropriate discarded products, notably through the establishment or support of repair/reuse networks.

5.3.3 Responses to Question 16 from Consultation Paper on Waste Prevention Programmes

79 out of 134 of the respondents to the consultation provided a specific answer to this question.

(a) Do you consider that Member States should be required to assess the opportunities for taking all 16 of the measures set out in Annex IV to the revised WFD?

Respondents were generally in favour of assessing opportunities for taking all 16 of the measures set out in Annex IV. 36 respondents answered yes to this question, as opposed to 13 who said no. Those that were not in favour argued that to do so would be too prescriptive, and that other approaches, such as a multiple interventionist approach throughout the process chain, would be likely to be more effective.

(b) Do you consider that the Commission's proposals will fulfil their aim of breaking the link between economic growth and the environmental impacts associated with the generation of waste?

Responses to this part of the question were divided almost equally between those that felt the proposals would break the link between economic growth and the environmental impacts associated with the generation of waste, and those that did not. 9 respondents said they felt it would and 8 said they felt it would not.

Those that felt it would argued that the proposals would be most effective if they were introduced as part of a wider process aimed at changing society's attitude to waste hoped that this will make waste production socially unacceptable. Others argued that it would work best if Member States were to take on board a commitment to waste minimisation. Those that argued that it would not felt that without effective waste minimization strategies pursuing challenging targets the proposals would not work. Others argued that no measures concentrating solely on waste management would do so and holistic measures were much more likely to be successful.

(c) Do you consider that the Commission's proposals will prove beneficial in terms of waste prevention and the meaningful measurement of progress in waste prevention or result in the imposition of administrative burdens and costs without such commensurate benefits?

A slight majority of respondents to this part of the question felt that the proposals were more likely to be burdensome than beneficial. 12 respondents argued they would be burdensome, whereas 10 argued they would be beneficial. Those who felt the proposals would be beneficial mainly argued that they would give strong support to waste prevention in the revised Directive. They did however also make clear that they would only really be effective if used proportionately.

5.4   UK Policy and Targets

In order to comply with the Landfill Directive, Waste Strategy 2007, sets the following targets for management of municipal waste. These are challenging and drive the agenda for effective resource use and in some cases waste prevention. They include (Table 5. 1):

Table 5.1 New targets from Waste Strategy 2007

	2005	2010	2015	2020
Household waste after re-use, recycling and composting (m tonnes)	18.6	15.8	14.3	12.2
% reduction from 2000	16%	29%	35%	45%
Equivalent per person figures (kg)	370	310	270	225

% reduction from 450kg per head in 2000	18%	32%	40%	50%
Household re-use, recycling and composting	27%	40%	45%	50%
Municipal waste recovery	38%	53%	67%	75%

"Recover" is defined as obtaining value from wastes through:

- Recycling;
- Composting;
- other forms of material recovery (such as anaerobic digestion); and
- energy recovery (combustion with direct or indirect use of the energy produced, manufacture of refuse derived fuel, gasification, pyrolysis, or other technologies).

Within England the Government will soon be setting new national; targets for the reduction of commercial and industrial waste. They expect to see C/I waste fall by 20% by 2010 compared to 2004 (Defra 2007).

The Landfill Directive means that targets for biodegradable municipal waste are very challenging. These require reduction in landfilling to 75% of that produced in 1995 by 2010 and then 50% of 1995 by 20103.

For re-use, recycling and recovery, there are European targets that apply to a number of waste streams (Table 5.2).

Table 5.2 New Targets for selected waste streams.

Waste	Current	Targets			
		2006	2008	2011	2015
Packaging - recycled	56%		55%		
Vehicles - recycled	81%	85%			95%
WEEE	-	50-80%			
Large batteries	90%			100%	
Portable batteries	2%			50-75%	

There are a range of `other` very useful targets for waste prevention e.g. for Government Departments to reduce total waste arisings by 5% by 2010 relative to 2004/5.

The Courtauld Commitment is vital here as retail sector seeks to minimise waste:

- design out packing growth by 2008;
- deliver absolute reductions by 2010; and
- following WRAP Business Plan to secure a 80 000 tonnes reduction in packing waste by 2010 and 10 000 tonnes reduction in household food waste.

There is a growing interest in carbon emissions and waste management and the aim is to reduce these emissions by at least 9.3 m tonnes of CO_2 equivalent by 2020 compared to 2006/7. Minimisation will play a major role in this.

5.5   Municipal Waste Management Strategies

In England, Local Authorities will have a Municipal Waste Management (MWM) Strategy, to provide a strategic framework for the management of municipal waste. It is anticipated that the Strategies should be developed and subscribed to by the Waste Collection Authorities and Waste Disposal Authorities in a given English County. The position is of course different if they are Unitary Authorities e.g. all are in Wales.

MWM strategies should consider the key Requirements. These are: (**see Additional resource 10** – Guidance on MSW):

- action and delivery;
- data collection and analysis;
- evaluation of options;
- timescale;
- integration with other plans;
- strategy scope;
- partnership working;
- communication and consultation;
- risk management; and
- monitoring and evaluation.

Within recent Local Authority Strategies there has been a strong emphasis in many places on waste minimisation / prevention. A very good example is the Dorset Waste Reduction and Reuse Strategy which amends supplementary report No. 7 of the joint local authorities Municipal Waste Strategy for Dorset (**see Additional resource 11**). This is a detailed 5 year strategy from 2005-2010.

5.6   Legislative and Administrative Framework (UK)

In England, County Councils are Waste Disposal Authorities (WDAs) and, if a Waste Planning Authority, have a statutory duty to prepare disposal plans and to dispose of Municipal Solid Waste (MSW). Within each county, the Borough or District or Unitary Councils are the Waste Collection Authorities (WCAs), who have a statutory duty to collect and transport MSW, to prepare recycling plans and encourage waste minimisation. The WCA needs to appoint a co-ordinator or committee whose role is to formulate a recycling plan with consideration of the most suitable collection options for the WCA area.

The voluntary and community sectors play an important part as partners in Local Authority practice in sustainable waste management. Central to their role is the development of waste reduction, re-use and recycling at a local level. Publicity and education are increasingly used to raise awareness of environmental issues with the general public. Some of the schemes established by these groups include furniture and electrical goods renovation, paint exchanges and scrap stores. Many of these initiatives have links with local authorities and private companies. Recycling directories have been produced by a number of these groups.

The Community Recycling Network (CRN) is one such scheme, set up by Friends of the Earth in 1992, to promote community waste management in the UK - both as an effective way of tackling the UK's growing waste problem and as a way to build the social economy. The CRN is a non-profit-making industrial and provident society with a membership of over 300, most are involved in community-based recycling schemes. The CRN provides umbrella services, support for local groups and a national voice for community recyclers.

You should address the following Action point, available in your Workbook

Action Point 5.0
- Critically assess which legislative and policy drivers are likely to be most influential in waste minimisation strategies over the next 10 years.
- Bring in several questions on say waste prevention programmes and then waste strategies – Do we use Vale of White Horse as an example of an early one in the day as it does not require to much time - do we include it here in text?

6. Pro-Environmental Behaviour

6.1   Recent Defra research in public behaviour change: Pro-environmental behaviour – for waste minimisation/prevention.

Studies suggest that psychology is an invaluable tool for investigating pro-environmental behaviour that underlies waste minimisation activities. The research base in the UK has been at a low level in this area and was highlighted for urgent action in the DEFRA – (WRRAG) - Waste and Resources R&D Research Strategy (2004 - 2007) (Defra, 2004 A and 2004 B), this is also found in Chapter 10.

It is important to note, that recycling and waste minimisation represent separate dimensions of waste management behaviour, and that waste minimisation behaviour itself consists of separate components – two key ones being waste minimisation at point of purchase and waste minimisation through repair or re-use. Therefore, waste minimisation, re-use and recycling should be considered separately when designing a waste minimisation campaign.

NB. This chapter is linked with, and can be used in conjunction with, information presented in the WRAP Recycling Managers Advanced Training Course - Improving Performance - Getting More People Involved.

Some general lessons from Defra research (see Additional resources 2 and 9)

Behaviours are complex and non-linear. Each behaviour is determined by various (often interrelated) factors, many of which need addressing simultaneously to facilitate change. Thus interventions should combine multiple types of instrument in a 'package' of measures (e.g. infrastructure, fiscal measures, and information). It is suggested that interventions first address external factors (most notably infrastructure and pricing) and then internal factors (e.g. psychological or attitudinal). As well as working on multiple factors, interventions need to work on multiple levels – ultimately addressing society as a whole in order to achieve sustained change.

Different audiences behave differently, and require targeted and/or tailored interventions. To be effective, policy measures usually need to be highly context specific. Devolving responsibility for policy development and delivery to local bodies (Local Authorities, business and industry groups, the voluntary sector and community groups) can help to ensure their suitability and can also help to build their legitimacy. Care should be taken to ensure that the relevant skills and resources are available within these organisations to take on these additional duties.

The audience for a change intervention should not be regarded as a passive target. Policy-makers need to view target audiences and other key stakeholders as 'actors' at the heart of the change process. Ideally, a total partnership working approach should be adopted in which change partners (including members of the public) are involved from the start in defining and redefining the problem through a continuous cycle of action and reflection, from which learning and innovation will result.

Feedback is vital to driving and sustaining change. Instead of understanding changing behaviour as a single event, it should be viewed as an ongoing

process. Policy-makers should ensure that interventions incorporate opportunities to learn from policy audiences – learning captured and fed back from the change process should influence subsequent policy. In order to facilitate this important reflective process, more effective and consistent data collection and collation is required. In future, the appropriate formal evaluation structures should be put in place at the stage of policy development.

Individuals have the potential to act as 'change champions'. Individuals are vital to delivering pro-environmental change, not just for themselves (on the level of individuals) but also within organisations and networks as 'agents for change' (both as managers and 'change champions'). Engaging, and nurturing, key individuals may be more effective in bringing about system-wide change than targeting the behaviour of all individuals.

Action needs to be taken now to address the pressing environmental problems we face today and in the future. The appropriateness and relevance of policies to encourage pro- environmental behaviour should be viewed in light of these massive and important global challenges. More far-reaching, targeted and effective policy action is needed than is currently evident. Change takes time, and measures need to be put into place now to influence societal change and respond to environmental pressures.

6.2   Audience Research

Audience Research is a key component for any waste minimisation campaign. Rethink Rubbish point out that:

"Knowing "who" to target is crucial to the effectiveness of waste awareness campaigns….. to target local messages, and services, to the audience its attitudes, issues and barriers ….. must be fully appreciated and understood. Every local authority has a variety of people with differing needs, attitudes and expectations living with it, yet in many cases blanket services are delivered."

Key source of Information
RecycleNowPartners (2004) Knowing your Audience [online]; Banbury: WRAP. Available from: http://www.recyclenowpartners.org.uk/planning-your-audience.htm. [accessed 31st October 2007]

There has been a significant amount of research work, mostly related to recycling, on audience categorisation / segmentation and general waste management behaviour (Brook Lyndhurst, ENCAMS, Environment Agency, MORI). The ENCAMS work on audience segmentation suggests that there are 5 general categories that could be used across society as a whole in respect of recycling (Table 6.1)

Table 6.1: ENCAMS Audience Segmentation (Source: adapted from ENCAMS (2002) Waste Segmentation Research)

Segment	%	Motivation	Description
Routine recycler	40	It's important to recycle	Social Group AB Age 40-50 Home owner Recycle frequently
Domestic cleanser	20	Having a tidy house is very important	Social Group DE Age early 30s Recycle infrequently
It's all their fault	23	I would recycle more if everyone else did	Young or retired Rented accommodation Average recycling
Busy dismissor	14	Too busy to spare time	Social Group C1 and AB Age under 35 Male Rented accommodation
Misinformed moaner	3	Not worried about landfill	Social Group DE Age 18-34 Work part-time

6.2.1 Targeting Distinct Behavioural Groupings

Knowing the categories/ segments of a community in respect of waste management behaviour enables campaign material to be designed to cost effectively target groupings that are most likely to respond. For recycling, ROUTINE RECYCLER and DOMESTIC CLEANSER are the segments most likely to respond to waste campaigns and display enhanced pro-environmental behaviour, e.g. increased participation, increased recognition.

- ROUTINE RECYCLER will adopt enhanced pro-environmental behaviour through BETTER INFORMATION campaigns

- DOMESTIC CLEANSER will adopt enhanced pro-environmental behaviour through the provision of services that ensure that household waste management behaviour can be CLEAN and hygienic.

There is a clear requirement to determine similar groupings / segments for waste minimisation.

6.2.2 Geodemographics

ENCAMS has developed a system called MOSAIC, which classifies every postal code in Great Britain into distinct lifestyle classifications. The classifications were created using a wide variety of data sources such as:

- housing type;
- electoral roll;
- census information; and
- socio-economic factors (e.g. unemployment).

There are 11 MOSAIC groupings which can be used as layered data in the production of street maps in local authority areas providing valuable information which can be further utilised in determining attitudes towards environmental quality issues and services and consequently waste minimisation and recycling campaigns.

6.3　Case Study

Pro-environmental behaviour: Determining the drivers for waste minimisation compared to reuse and recycling in Exeter (Barr et al., 2001)

6.3.1 Aims of Research

This case study is based upon research carried out in Exeter in 1999. It used cognitive psychology to understand pro-environmental behaviour and to probe differences between recycling, reuse and waste minimisation activities (Barr et al., 2001). Such an understanding would enable the use of questionnaires to ascertain likely householder response to new waste management practice and hence allow waste planners to more accurately predict outcomes for proposed projects.

6.3.2 The Development of a Conceptual Framework

The first stage of the research involved the development of a conceptual framework using 3 predictors:

- environmental values;
- situational variables; and
- psychological variables.

Environmental Values

Researchers have argued that those individuals with more positive general environmental values and attitudes are more likely to have higher levels of participation in waste management behaviour. Environmental values form a distinct category with which to understand waste management behaviour, representing fundamental underlying orientation of an individual towards the environment.

Situational Variables

Situational variables are defined by a householder's personal circumstances at a given time. As circumstances tend to change it can be considered that waste management practices may also alter. The following situational factors were considered:

- differentiation in recycling services;
- socio-demographic (e.g. it was found that female, college trained, high-earning, politically liberal individuals in Exeter were more likely to participate in recycling than others); and
- knowledge (see Info Box 6.1).

Info Box: 6.1

Knowledge

Researchers have identified `knowledge` as an important predictor of waste management behaviour. `Abstract general knowledge` is a measure of total environmental knowledge and as such is a weak predictor for waste management. `Concrete knowledge` about specific waste related issues helps ensure higher levels of householder participation in a number of waste management levels.

Psychological Variables

Psychological variables are the perceptions and personal traits of an individual. It is argued that those with strong moral and personal norms are more likely to participate when given the opportunity and when they are activated by perceptions of a positive outcome. **Subjective norms**, whereby the importance of social pressure on individual action is assessed, has been used to predict recycling behaviour. Awareness of others recycling and accepting their behaviour as normative is likely to increase feelings of social pressure to conform. Those that believe that they have strong personal responsibilities towards the environment are likely to have developed \`**environmental citizenship**\` and this psychological variable is likely to lead to enhanced pro-environmental behaviour.

6.3.3 Results and Conclusions

The research showed:
"Recycling behaviour is fundamentally different from, and has different antecedents to, minimisation and reuse behaviour".

Waste minimisation and reuse behaviour are based around:

- environmental values;
- previous experience in environmental behaviour; and
- environmental knowledge.

Recycling is based around:

- normative behaviour;
- convenience of recycling;
- knowledge of services; and
- access to kerbside scheme.

In Exeter it was found that the principal factors acting upon waste minimisation and reuse to encourage pro-environmental activities in these areas were:

- active concern;
- experience;
- waste problem and threat;
- citizenship; and
- environmental concern.

It therefore appears that situational, psychological and values based variables (Table 6.2) have an important part to play in formulating attitudes towards minimisation and reuse.

Table 6.2: Summary of Research from Exeter (Barr et al., 2001)

Environmental Values

- These are important in influencing minimisation and reuse behaviour but not recycling.

Situational Variables

- Context is important in shaping recycling behaviour.
- Importance of \`concrete knowledge\` and \`policy knowledge\` important for minimisation behaviour.

> **Psychological Variables**
>
> - elements of altruistic attitudes were important in influencing minimisation and reuse behaviour;
> - intrinsic motivation was only linked directly to reuse behaviour;
> - environmental threats linked to problem perception had indirect effects on minimisation and reuse but not recycling;
> - environmental citizenship had important impact on minimisation and reuse;
> - logistical factors had major effect on recycling; and
> - subjective norms were important to predict recycling behaviour.

6.4   Waste Minimisation and Reuse Differ from Recycling

Minimising waste is suggested to be affected by a willingness to do such an activity and tends to be among older people (mainly female) with knowledge of policy matters. Conversely reuse has the same attitudinal antecedents but it appears that factors such as storage space (situational) are just as important. Nevertheless, waste minimisation and reuse behaviours are based upon fundamental values, an active concern for the environment and the population base of the community.

From research it would appear that recycling is a very different activity with far fewer factors involved. Environmental values are unimportant here, and the principal determinants of a willingness to recycle are the acceptance of the norm to recycle, convenience, knowledge about the system and `active concern`. Willingness to recycle is highly norm based.

Some researchers have managed to look at a categorisation of waste minimisation behaviour by age etc for a given location. This has enabled Local Authorities to plan campaigns to engage a given audience for a given place (**see Additional resource 12 – Tonglet paper**)

6.5   Is there only one model that helps us understand behaviour change?

The constraints of theories and models (**see Additional resource 9; Promoting pro-environmental behaviour; existing evidence**). It is important to remember that socio-psychological behavioural models are specifically designed to generalise behaviours and predict aggregate outcomes. Thus these models do not identify the wide variability in the behaviour of different individuals, but rather describe the average behaviour of all individuals. Clearly no individual, organisation or society actually behaves in precisely the way a theory or model describes, as they will be influenced by various different factors, impacting in different combinations, and to different extents.

There are limits to how meaningful a model will be if it is derived from one context and applied in a different one. In other words, models don't travel well, although they vary in how far they can be 'stretched'. The study has identified numerous and increasingly more sophisticated models for understanding specific pro-environmental behaviours, for example, car use, household waste production, recycling, composting, etc. These can be highly useful to policy-makers in understanding which variables determine end behaviours and how this might occur. However, they cannot demonstrate exactly how to bring about behaviour change.

Increasing the number of variables enhances the predictive capacity of a model but the complexity of the relationships modelled may well leave the policy-maker uncertain about how to intervene. Furthermore, models require empirical data to operate and their outputs can only be as accurate as these data are representative and robust. The more complex the model the more data it requires, and the more costly it is to populate.

Having outlined these limitations and constraints, it should be recognised that theories and models are of particular value in understanding which internal factors inform the end behaviours.

The literature pertaining to theories and models of pro-environmental change is extensive. It can be broadly grouped into three largely discrete knowledge bases, namely:

i) social-psychological models of individual behaviours;
ii) theories of organisational change; and
iii) systemic/whole systems (or societal) change.

Research suggests that policy-makers could and should be addressing public behaviours on organisational (i.e. group) and systemic (i.e. societal) levels, as well the individual level.

6.6   Issues for Waste Minimisation Campaigns

Cognitive psychology modelling can provide the means to identify the driving forces for waste minimisation in a given area and enable planners to design cost effective campaigns.

For minimisation and reuse:

- the campaign should make clear how to minimise and reuse (knowledge) and be placed in the context of a long-term integrated programme with local players / partners. Emphasis must be placed upon involvement of retail sector in any project;
- need to engage local organisations (NGOs) in local campaigns and bring in value to local community;
- need to focus first upon easily influenced groups (over 65 etc) that will respond to knowledge based campaigns based upon local issues. The first place to start is purchasing to reduce waste as this does not require additional space in home;
- these campaigns will be different from recycling campaigns and require different messages. There is a need to accept that a plateau has been reached in recycling campaigns in some areas; and
- general waste campaigns with a lack of focus will not stimulate waste minimisation. School campaigns need to move away from recycling and bring in purchasing to reduce waste; children will often readily purchase rechargeable batteries etc.

Studies (Barr et al, 2001) have suggested that increased and improved kerbside systems will result in increased tonnages being recycled. This is not true for minimisation. In designing waste reduction campaigns that will focus upon minimisation and reuse campaigns it has been pointed out that:

- minimisation and reuse behaviour are much more complicated than recycling and less well explained by any simple regression model;
- willingness to perform these behaviours is essentially values based;
- what are required are clear campaigns that focus upon the problems of waste and the need for personal action;

- the campaign will have to make clear how to minimise and reuse (knowledge) and be placed in the context of a long-term integrated programme with local players / partners;
- these campaigns will be different from recycling campaigns and require different messages;
- general waste campaigns with a lack of focus will not stimulate waste minimisation; and
- having a conceptual framework for pro-environmental behaviour enables research on the local population to yield valuable data to use to construct the messages to stimulate activities in a given activity.

6.7   Campaign guidance from recent Waste Prevention Strategies/ Plans

The Scottish Household Waste Prevention Guide states that there is a need to base campaigns on an evidence based approach has been emphasised in the Scottish Household Waste Prevention Guide (**see Additional resource 13; Scottish Household Waste Prevention Guide**). They say that:

Communicating your waste prevention message

The value of effective, consistent public waste education and awareness campaigns is demonstrated by the results of surveys carried out by the Scottish Waste Awareness Group (SWAG) over the last three years. These surveys found that 81% of Scottish households participated in some form of recycling activity in 2006 compared with 51% in 2003. This change in public attitudes and behaviour has been brought about by the introduction of new and improved recycling facilities, supported by the Waste Aware Scotland campaigning programme, developed by SWAG. The programme has been delivered at the local level across Scotland by local authorities, the community sector and other stakeholders.

This Guide provides:

- a step-by-step guide to researching, planning, developing, implementing and evaluating your own Waste Aware Scotland waste prevention campaign; and
- information and advice on the services that SWAG can offer to help you deliver your campaign successfully.

Researching your campaign: Why should I carry out research?

Comprehensive research has underpinned the successful development and implementation of the Waste Aware Scotland campaigning programme. This should be something that you consider carefully before developing your waste prevention campaign.

The main aim of your campaign will be to change public attitudes and behaviour towards a specific waste prevention issue. But before you can plan a campaign to change public attitudes and behaviour, you need to establish:

- what the audience(s) currently think; and
- what they are doing about the particular issue featuring in your waste prevention campaign.

The aim of research ahead of a waste prevention campaign is to identify:

- current public attitudes and behaviour towards the issue;

- barriers that may stop the public changing their attitudes and/or behaviour towards the issue; and
- incentives that may encourage the public to change their attitudes and behaviour towards the issue.

How can I carry out research?

The most common methods used to inform the development of education and awareness campaigns are:

- desk-top research (a review of existing research and case studies);
- surveys; and
- focus groups.

Barnet has produced a Waste Prevention Strategy based upon recent best practice (**see Additional resource 14**; **Barnet Waste Prevention Strategy**). Barnet has a vision, they say:

"The waste hierarchy, the growing amount of waste in Barnet and the costs of putting our waste in landfill sites are all driving forces behind this Waste Prevention Strategy. In its role as a community leader, the council will promote a vision for Barnet which will drive the strategy."

The vision demonstrates the council's commitment to preventing waste and the links between waste prevention and our key corporate priority of a Cleaner, Greener Barnet. It also highlights that Barnet's approach to waste prevention is one of shared responsibility with residents and partners.
To prevent waste by working together greener Barnet
This vision will drive our approach to meeting our key waste prevention objectives and targets:

Objective 1: Reduce the overall amount of waste from households:

- limit waste per person to the 2004/05 level of 477 kg/pp per year by 2008;
- arisings per person to be reduced to 452 kg/pp per year by 2010;
- arisings per person to be reduced to 425 kg/pp per year by 2015; and
- arisings per person to be reduced to 375 kg/pp per year by 2020.

Objective 2: Increase participation in waste prevention activities:

Specific targets will be formulated for the individual initiatives as baseline data is gathered. The council will approach its objectives through the three key activities outlined below in the short-term. These activities and initiatives have been identified through consultation with residents, businesses and partners, as well as on the basis of several criteria including:

- the most discarded materials;
- the short-term chances of success;
- cost effectiveness;
- laying a foundation for changes in behaviour and attitudes; and
- building on existing initiatives.

6.8   The Vale of the White Horse Waste Minimisation Strategy

This is an example of an early (mid 2000s) strategy and this will be an activity in the training event in light of present Local Authority understanding of strategy, policy and pro-environmental behaviour.

6.8.1 Part 1 – The Policies that underpin the Strategy

1.1   The Council's Vision is "to build and safeguard a fair, open and compassionate community" (BVPP p1). Its aims include to:

- provide high quality public services which are effective, efficient and responsive to the needs of people within the Vale;
- protect and improve our environment; and
- encourage a strong and sustainable economy which is beneficial to all who live in, work in or visit the Vale.

1.2   Under the agenda for "Protecting our Environment" (BVPP p9) the Council aims to:

- Increase waste minimisation.

1.3   One of the Council's Priorities (BVPP p17) is to:

"Note that the medium term plan for 2003 / 2004 and 2004 / 2005 contain a contribution to contingency to address the need to meet Central Government targets for recycling and waste minimisation and to instruct the incoming Director of Environmental Services to ensure that a scheme which meets targets agreed for 2005 is brought to the July Committee cycle."

1.4   The Council has produced a Waste Recycling Plan which shows the Council's strategy for meeting the Government target of recycling 25% of household waste. A new plan is being considered (BVPP p20).

1.5   The Council is working on a Community Strategy "to enhance the quality of life of local communities and contribute to the achievement of sustainable development through action to improve the social, economic and environmental well-being of the area and its inhabitants". (BVPP p22).

1.6   At its meeting on 15 May 2002 Council adopted (Minute En.29) a Policy Statement on Waste Minimisation and Recycling. It expressed the belief that Waste Minimisation is the most important priority for the Council in its future Waste Management Strategy. It aims to:

- utilise every reasonable opportunity to encourage central and regional government, businesses and our community to minimise waste at source;
- increase our efforts to educate our community and promote responsible citizenship by waste avoidance, minimisation and recycling;
- develop our partnership links with neighbouring waste collection and disposal authorities to achieve maximum integration and thereby effectiveness in waste management; and
- continue to develop our capacity to recycle waste in the most efficient and effective ways possible.

1.7   Officers are currently working on a Waste Management Strategy.

6.8.2 Part 2 – Technical, Baseline, Planning and Legal Information

2.1   For the purposes of this strategy Waste Minimisation is taken to be the reduction of household waste which is presented to the Waste Collection Authority. It includes resource management, waste reduction, waste reuse and home composting. It does not include waste recycling and recovering value from residual waste.

2.2   Since the Second World War the volume and weight of waste which the average household seeks to dispose of has been rising inexorably at about 2% per annum. In the Vale this currently amounts to about 360 kg per head of population each year. Whilst recycling helps to reduce the volume going to landfill, it would clearly be more sustainable if every household could reduce the quantity of waste it offers for recycling and disposal through practising waste minimisation.

2.3   Industry clearly has a key role to play through product design and minimum packaging. The Council can play only a limited role in this area, although it did sponsor a joint website with the Environment Agency designed to advise businesses on waste minimisation.

2.4   The Government and European Union have a major role in regulating industry and in the fields of education and promotion. The Government also influences the economics of waste disposal through such measures as Landfill Tax and Recycling Credits.

2.5   Local Authorities, both Waste Collection (Districts) and Waste Disposal (Counties), have a role to play, particularly when working in partnership. For example in Oxfordshire the County and Districts are working through the Oxfordshire Joint Household Waste Management Strategy. Their current initiatives include:

- promotion of home composting;
- community composing;
- community action groups;
- real nappy campaign;
- junk mail reduction; and
- waste reduction pack.

2.6   The general public has a key role to play in waste minimisation. Individuals can make choices about the products they purchase, avoiding those that are over packaged, buying in bulk and choosing returnable containers or natural packaging. Clearly a well educated public can make more informed choices.

2.7   The Council is currently involved in the following waste minimisation initiatives:

- home composting promotion;
- working with schools on educational work; and
- working with County to set up Community Composting Groups.

2.8   The main barriers to greater waste minimisation are seen as:

- lack of resources (personnel and budgets) for this area of work; and
- absence of a promotion strategy.

2.9   The main motivators to greater waste minimisation are seen as:

- public desire for more information (demonstrated by Best Value survey); and
- increase in waste arisings needs to be controlled.

2.10   The impact of increased waste minimisation would be beneficial to the Vale in the following ways:

- reduced cost of waste collection and disposal;
- reduced use of fuel and emission of pollutants in transporting waste;
- reduced landfill with its attendant pollution risk; and
- increased awareness of residents on waste related issues.

2.11   It is difficult to put a figure on the quantity of waste reduction which could result. If home composting is included in the equation then it is possible that up to 30% of the waste stream could be eliminated.

2.12   The risks associated with increased waste minimisation are seen as:

- results are difficult to quantify; and
- could result in reduction in recycling as proportion of waste arisings.

6.9   Building on an understanding of household pro-environmental behaviour: Producing Waste Prevention Plans.

Ultimately, all Strategies have to lead to the production of a detailed Plan that has been designed to meet set targets. An excellent example is found in the Scotland Household Waste Prevention Plan (**see Additional resource 15**; **Scottish Household Prevention Guide**), where actions are based on a deep understanding of household pro-environmental behaviour.

You should now address the following action point, available in your workbook.

Action Point 6.0
What are the perceived advantages of Pro-environmental studies when developing a Waste Minimisation Strategy?
How do you consider this information would be utilised within your organisation?
Critically evaluate the use of Pro-environmental Behaviour in the development of a Waste Minimisation Strategy

7. Approaches to Waste Minimisation

7.1   Introduction

The National Resource and Waste Forum (NRWF) (**see Additional resource 3**) have suggested that waste minimisation approaches can be classified as `supply side` (e.g. retailers and manufacturers) and `demand side` (e.g. consumers). In each approach there are a wide number of measures (e.g. economic instruments) that could be used to stimulate waste minimisation activities by manufacturers and retailers (Table 7.1) and consumers and communities (Table 7.2).

The NRWF carried out a gap analysis to assess the progress being made in the UK in respect of household waste minimisation activities for `supply side` and `demand side` (Table 7.1 and 7.2).

Table 7.1: Supply Side Activities (Themes) and Likely UK Progress (Measures) (see Additional resource 3)

Themes / Measures	Product Specification & Design	Product Labelling & Marketing	Product Service Systems	Take back, Reuse & Refurbishment
Education & Awareness Raising	+	+	+	+
Legislation & Enforcement	++	+	-	++
Partnership & Voluntary Action	+	-	+	+
Economic Instruments, Penalties, Rewards	+	-	+	+
Proportion of Waste Stream Targeted	White goods, Packaging, Wood 33%	White goods, Metals 5%	Nappies, Paper, Wood, Metals 15%	Packaging, White goods 24%

Key: + negligible, ++ poor, +++ moderate, ++++ good, +++++ excellent

**Table 7.2: Demand Side Activities (Themes) and Likely UK Progress
(Measures) (see Additional resource 3)**

Themes / Measures	General Waste Issues	Smart Shopping	Home & Community Composting	Community Reuse & Refurbishment
Education & Awareness Raising	+	+	++	+
Legislation & Enforcement	-	-	-	-
Partnership & Voluntary Action	+	+	+	+
Economic Instruments, Penalties, Rewards	+	+	+	+
Proportion of Waste Stream Targeted	Nearly all components of waste stream	Packaging, nappies, food, white goods 40%	Garden waste, some kitchen waste 29%	Wood, white/ bulky goods, IT Equipment and furniture 10%

Key: + negligible, ++ poor, +++ moderate, ++++ good, +++++ excellent

Following on from the initial NRWF analysis, a list of activities was produced and they
were ranked according to their potential to aid waste minimisation (Table 7.3). In the
scoring system High implies positive and Low implies poor. In the specific cases of
timescales of introduction – High (H) is less than 1 year, Medium (M) less than 2 years
and Low (L) less than 3 years. An overall score out of 10 is given in terms of likely cost
effectiveness (Table 7.3), the higher the score the more cost effective. This enables
planers to select the most appropriate activities to go with the Themes and Measures
(Table 7.1 and 7.2).

**Table 7.3: Ranking of Some Waste Minimisation Activities (see Additional
resource 3)**

Activities	Waste reduction	Ease	Timescales	Cap. Exp.	Score
1. Community and home composting	1 - 3%	H	H	M	8
2. Supply chain packaging workshops	0.5 - 1%	M	H	H	7
3. Training trading standards officers	0.5 - 1%	M	H	H	7
4. Refillable packaging – explore options	0.5 – 1%	L	M	L	5
5. Unwanted mail guidance	0.1 - 0.5%	H	H	H	7
6. Support companies on eco-design	0.5 - 1%	M	M	M	7
7. Co-ordinated local reuse and refurbishment	0.5 - 1%	M/L	H/M	L/M	6
8. Support Product Services Business development	0.5 - 1%	M	M	H	6

7.1.1 Benefits of Waste Minimisation

■ waste minimisation. Packaging can be reduced and goods shared, that would normally be only used a few times before becoming waste, to reduce consumption;
■ access to goods and services. Local Exchange Trading Schemes (LETS) offer services that may not be affordable to many;
■ job training. Many schemes offer training opportunities at a range of Levels, e.g. NVQ 2;
■ social inclusion. Toy libraries etc. promote social inclusion; and
■ waste avoided for treatment and disposal.

In a waste reduction campaign it is essential to promote the benefits to householders. For LETS these include:

■ access to a range of services;
■ no capital cost outlay;
■ ability to benefit from own skills;
■ ability to develop skills;
■ developing new, local friendships – fostering community spirit; and
■ less need for storage space for many items.

7.1.2 Gap Analysis.

For any waste reduction campaign that will utilise a product service component, some key areas for gap analysis in a given area, include:

■ is there a real nappy project?
■ is there a toy library with a range of suitable activities?
■ is there a local LETS project?
■ are local breweries running bottle return schemes?
■ are dairies supporting milk rounds?
■ is there an active organic produce home delivery service?
■ is there good public awareness, e.g. do local libraries advertise schemes?
■ is there a suitable Service Guide e.g. Enfield `Wipe Out Wastes` Guides? (www.enfield.gov.uk)
■ are potential partners aware of external funding opportunities?
■ can the local business community help with accommodation and hosting trade fairs for public?

7.2   Community Reuse and Takeback

7.2.1 Types of Activities

Donation and exchange of goods. These include charity shops etc

■ Waste Exchange Web Site. The Bristol Swap It Web Site is free to use and everything is free or to be swapped (www.swapitbristol.org);
■ Local Exchange Trading System (LETS). LETS is a means of trading goods and services without money changing hands. Money issued within system can only be spent in system (www.letslinkuk.org);
■ Community Re>Paint. The national network of 44 schemes distributed some 53 000 litres in 2001, a nine-fold increase on 1998. An average scheme costs around £3 000 per annum to run, the network has created some 315 part-time jobs (www.communityrepaint.org.uk);
■ Children's Scrapstore Project. This voluntary organisation takes clean and safe waste products to create resources for children's art and play activities;

- Food Share project. Where food that is approaching `use by date` is donated to the homeless (www.crisis.org.uk);
- Refurbishment and Reuse. The Furniture Re-use Network (FRN) has 300 projects dealing with furniture and WEEE recycling (www.frn.org.uk). Tools can be reused (www.tfsr.org.uk). Computer reuse has no large-scale networks at present but some organisations act as gateways (www.free-computers.org) ;
- Co-ordinated larger scale developments. These include the Oxfordshire Big Store and the Shropshire Household Furniture Recycling Scheme (www.shropshireonline.gov.uk);
- Textiles. The Salvation Army deals with 17 000 tonnes of clothing a year, much of which is used internationally (www.wasteonline.org.uk).

7.2.2 Project Benefits of Waste Minimisation

- Oxfordshire CC estimates that over 15 000 tonnes of goods go to landfill annually that could be reused;
- Hazardous waste reduction. Removal of paint, batteries and oil from waste stream;
- Economic development. FRN divert some 63 000 tonnes per annum with a declared disposal value over £2,500,000. Some 5,000 people are involved in UK with FRN projects (www.frn.org.uk).
- CREATE suggests that 62% of their leavers have gone on to full time jobs (www.createuk.com);
- Social inclusion. Bristol SOFA deliver goods to some 5,000 low-income families (www.sofaproject.org.uk).

7.2.3 Key Considerations

- SMART targets e.g. increase tonnage reused in local authority by 50% in 2 years;
- Legal issues. Environmental Impact Assessment may be needed if there are possible environmental impacts. More information on legal issues can be found at http://www.environment-agency.gov.uk/business);
- Quality and cost issues. You need to research the market to determine your pricing policy;
- Organisation. Will the project be a not for profit company, a direct local authority operation or a private sector business;
- Staff qualifications and training. Staff needs management, marketing and social work skills at a range of levels. It is estimated that you will need around 1 qualified member of staff to 4 unqualified;
- Premises. Storage areas, workshop areas, indoor sales areas, office space and car parking;
- Health and Safety. Employers must take out liability insurance to cover costs of employee's claims. Discuss issues with Health and Safety Executive (www.hse.gov.uk);
- Sourcing goods;
- Transport and Handling. Lorries need tail lifts for heavier goods, the HSE maximum weight for men is 25 kg etc. For lorries over 7.5 tonnes a goods vehicle operator licence may be required;
- After Sales Service. Customers' service agreements can be complex and include: the quality of goods, delivery and installation and how faulty goods will be dealt with;

7.2.4 Monitoring and Measuring

Reuse is measurable. All projects must keep a record of the wastes that enter and the output in process goods and residual waste mass. This should be done in a form of mass balance.

A project that may claim recycling credits will already weigh or estimate the weight of material. The Community Recycling Network (www.crn.org.uk) `Measure Your Treasure` project has developed data gathering and reporting protocols.

Key Performance Indicators are used to measure and report (**see Additional resource 16 – KPIs**). They need to be developed to expand upon project benefits e.g. from the social perspective KPIs could include:

- number of jobs which last 13 weeks or more;
- number of training placements;
- number of staff receiving NVQ level 1 or 2 training; and
- tonnage of particular goods given to High Deprivation Areas.

7.3   Container Reuse and Other Deposit - Refund Schemes

In the UK most manufacturers / retailers have been working towards optimised one-way packaging distribution with recovery through kerbside collection schemes, bring banks and commercial collections. There is, however, very little reuse and relatively low rates of recycling compared to some EU countries. Milk rounds are the classic example of an effective (in this case non-deposit) container reuse scheme, making use of durable bottles that are able to withstand many trips. Milk rounds are in decline in the UK, in the main due to competition from supermarkets. In some countries, however, return and reuse schemes play an important role as noted below (Info Box 7.1).

> **Info Box 7.1**
> **Deposit - Refund on One-Trip Containers, Germany**
> On 1st January 2003 Germany introduced a system for deposits on certain beverages sold in single-use (one trip) containers. This applies to those containers where the market share for the alternative reusable containers (i.e. equivalent refillables) falls below 72% for two consecutive years (currently applies to beer, mineral water and carbonated drinks). The deposit is paid at point of sale and covers containers of all materials, and products that are both domestic and imported. Levels range from 25 Eurocents on small containers to 50 Eurocents on bottles larger than 1.5 litres. As containers are to be returned to the point of sale, proof that the deposit has been paid is required (customers need to retain their receipt, or are provided with a token). Companies that do not comply will face the possibility of legal action and fines.

7.4   Community Refurbishment Initiatives

The UK has a large number of community initiatives which address waste, often run by members of the Community Recycling Network (CRN) and the Furniture Recycling Network (FRN). Community Waste Action groups, involving a wide variety of activities from communal composting on allotments to art from waste projects, began in Bristol and South Gloucestershire (through The Recycling Consortium) and now operate in several other parts of the country.

The UK also has a variety of community-led reuse and refurbishment projects. Several schemes support re-use of electrical goods and furniture involving some level of repair or refurbishment. These include "CREATE" (Liverpool and London), "The SOFA Project" (Bristol) and the Renew projects (Gateshead and elsewhere). "Save Waste and Prosper's" (SWAP) Re>Paint scheme indicates what can be achieved in terms of collecting hazardous materials for re-use. While such schemes reduce waste arisings, their primary aim is social in terms of offering jobs to the disadvantaged and providing low cost goods for poorer households.

7.4.1 Second-hand Retail Outlets

Reuse and refurbishment community initiatives are common elsewhere, where, as in the UK, they can fill a gap or niche not tackled by the local authorities or other organisations. The example (Info Box 7.2) below demonstrates reuse of goods through retail outlets, primarily warehouse type stores where the public can purchase goods which others have dropped off.

The SuperShed initiative in New Zealand is an example of a successful project run by the Recovered Materials Foundation, which has overcome many barriers and changed from the equivalent of a loss making civic amenity site with no incentives for the public to use the site, to a retail warehouse which covers its own costs and makes a profit through the sale of waste goods.

Info Box 7.2
Reuse and Refurbishment, France
Emmaus Refurbish, a not-for-profit organisation, collects and organises the reuse and sale of stationery, clothes and domestic appliances. The organisation makes around 535,000 collections from houses each year and estimates that it removes some 3.5 million m^3 of material. It finds beneficial uses for much of it, including 16,200 tonnes of textiles.
The organisation has parallels with the UK Community Recycling Network and the charity textile recycling initiatives. It operates throughout France to provide a house clearance and collection scheme through its network of 110 communities. Each Emmaus Community has a warehouse to store materials, a workshop to refurbish goods and access to retail outlets or its own outlets. The outlets may specialise in particular types of goods, for example electrical appliances, furniture or materials such as metals.
Emmaus supports those who work for the programme by paying them a wage and providing training. The organisation also relies upon the help of volunteers who bring particular expertise to the programme.

7.4.2 Materials Exchange

Materials Exchange schemes operate on the principle that one company's waste is another's raw material. Materials Exchange facilitates the exchange of materials in various ways. Often internet based, schemes have various approaches to the goods they handle; for example, payment may or may not be required, a charge may be made for delivery or the purchaser must pick up the materials or goods. The variety of goods on offer varies from household items, such as electrical appliances, to surplus stock or process waste from businesses. There are many materials or waste exchanges in the UK, and website based examples include:

- www.materials-exchange.org.uk - a free online information service, mainly for local businesses;
- www.resource-not-waste.co.uk - Norfolk Materials Exchange, a collaboration of not-for-profit organisations;
- www.wasteontheweb.co.uk – Horizon South West Materials Exchange.

7.4.3 Financial Support for Community Initiatives

Community or not-for-profit initiatives can require either start-up funding, or support funding throughout the project lifetime. In the UK such funding may come from a number of sources including the New Opportunities Fund or European Community funding (ESF or ERDF).

7.5   Non-Packaging Products – Eco-Design and Take Back

Private sector take-back initiatives, either through voluntary arrangements or through some form of producer responsibility legislation, are increasingly common. Well known examples include Xerox and Kodak (take back of disposable cameras). In the EU we have the Packaging and Packaging Waste, End of Life Vehicles, Waste Electrical and Electronic Equipment (WEEE) and Restriction of Hazardous Substances (RoHS) directives, all of which require product recovery systems to be established and recovery / recycling targets to be met. All have eco-design implications in terms of design for minimisation and reuse, as well as recycling.

7.5.1 Voluntary Initiatives Involving Retailers

In the UK, retailer involvement in 'Smart Shopping' had been limited. A Defra initiative, called Pitching Green, which produced a twice yearly e-newsletter which aims to make businesses aware of the opportunities for marketing the environmental benefits of products through the use of green labels, has had some success.

In terms of retailer initiatives, larger supermarkets like Tesco, Safeway and Sainsbury's do sell 'bags for life' at low prices. Sainsbury's offered other incentives as noted in the Info Box 7.3 below.

Info Box 7.3
Waste Minimisation Incentives at J. Sainsbury
Sainsbury's has done a number of things to encourage people to reduce their use of disposable plastic bags. The measures have included:
- The subsidised sale of robust plastic 'smart' boxes for people to use as shopping baskets
- The sale of durable plastic 'bags for life' at checkouts for 10p, which are replaced free of charge when the old one wears out

1p cash-back for every box / bag that customers re-use and the provision of charity boxes in which to donate this money to a local good cause.

There are very rapid developments in this area, much due to the good work of WRAP. The Courtauld Commitment (see section 4.3.4) will have a profound impact here and you will need to monitor this on a very regular basis. These developments are excellent for a campaign.

7.6   Product Service

In the past we have been used to buying pure products or pure services. Today the boundaries are more blurred. In the USA the term 'servicizing' is used for the supply of functions or product-based services rather than the sale of pure products. It has been advanced as a way of improving user efficiency and minimising resource wastage and pollution.

The recent SusProNet (Sustainable Product Service Network) Review of Product Service Systems (PSS) comes to the conclusion that today there are three categories of PSS:

- Product oriented PSS (close to a pure product);
- Use Oriented PSS (a fairly even mix of product and service);
- Result Oriented PSS (close to a pure service).

Leasing is a half-way house. To the extent that it encourages manufacturers to retain ownership of their products at the end of their lives, they may close the loop by recovering their equipment, capturing residual value and reducing waste levels. This is of course made easier through appropriate design for reuse, remanufacturing and recycling.

7.7   Qualitative and Quantitative Waste Minimisation

7.7.1 Some Definitions

The Waste Framework Directive of 1975 (75/442/EEC) as amended in 1991 (91/156/EEC) stresses the fundamental importance of waste minimisation and makes a distinction between:

■ Qualitative waste minimisation and reduction – using less toxic or less hazardous resources and / or producing less toxic or less hazardous wastes (and using less in quantitative terms); and
■ Quantitative waste minimisation and reduction – using less resources and / or producing less wastes in tonnage terms or in terms of resources / waste per unit of product/service.

In terms of qualitative waste minimisation, a major step has already been taken with reference to Waste Electrical And Electronic Equipment (WEEE) there is a Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) (02/95/EC), and Member States had to ensure that, from 1st July 2006, new EEE put on the market does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

At the other end of the life cycle, the End-of-Life Vehicle (ELV) Directive (00/53/EC) is also illustrative in preventing qualitative waste, pollution waste and environmental impacts, with a key element being the need for 'de-pollution' of a vehicle, to take place before any recycling or recovery. This involves oils, brake fluids, air-conditioning fluids and air bags, all of which are to be classed as hazardous wastes and will require appropriate treatment/disposal routes.

These are examples of 'absolute' waste minimisation involving bans on certain hazardous/toxic resources and/or wastes.

In qualitative waste minimisation terms, the RoHS Directive accompanying the WEEE Directive (see section 4.3.5) is setting a very important precedent in addressing the use of toxic resources, although there will always be a time lag in terms of products put on the market and becoming waste. A recent estimate suggests that 50 - 70% of products become waste within twelve months.

7.7.2 The National Household Hazardous Waste Forum (NHHWF) and Qualitative Waste Minimisation.

The National Household Hazardous Waste Forum (NHHWF) is a stakeholder-led initiative that seeks practical solutions to problems with HHW. It produces case studies on topics such as:

■ Oil Care (www.oilbankline.org.uk)
  The Oil Care Campaign (OCC) is a national pollution minimisation initiative and aims to improve oil recycling by encouraging the public to take waste engine oil to recycling banks;

- Community Re>Paint (www.communityrepaint.org.uk)
  Some 300 million litres of paint are sold each year in the UK, of which some 38 - 40 million are hoarded or wasted each year.

Community Re>Paint is a national network with some 50 schemes, which divert unwanted paint from the waste stream and redistribute it free of charge within the community. Each scheme has paint collection points at retailers, local DIY stores, HWRCs etc. More than 50,000 litres are diverted each year away from landfill to the community. (Tel: 0113 243 8777).

The NHHWF also helps support areas such as:

- WEEE Directive;
- ELV Directive;
- Batteries Directive.

7.8 Key Performance Indicators

Key performance indicators (KPIs) are a way of measuring and monitoring campaigns **(see Additional resource 16)**. To develop KPIs for a waste minimisation campaign it is necessary to consider:

- Campaign aims, messages and objectives. Is it a general waste awareness or a specific waste minimisation campaign?
- Campaign strategy. Methods for delivery: is it doorstepping, leaflets, multimedia or a combination of all? Marketing and communications: who is the target group(s)? What phases do you have in the campaign to target groups with increasingly sophisticated messages?
- Monitoring and review. What techniques will you use? Analysis of waste arisings? Recording Opportunities To See (OTS)? Quantitative questionnaires?
- Action plan. What tasks are you going to carry out? Who is involved? Milestones?
- What infrastructure and resources do you require? Do you have the staff who are properly trained in required techniques?
- Has a detailed budget of income and expenditure been developed?
- Are all key decision makers and opinion formers partners in the campaign?
- Outcomes must be measured regularly.

KPIs are required for:

- Uniformity in campaign criteria and techniques e.g. monitoring and measuring criteria;
- Accurate collection of data;
- Campaign evaluation;
- Comparing campaigns to determine best practice;
- To develop an insight into national trends and compare to international best practice;
- To disseminate a compressive analysis via a final report;
- To justify the future allocation of funds to such activities.

7.8.1 Possible KPIs for a Waste Minimisation Campaign (Table 7.4)

Some Possible Hard Targets

- Percentage and tonnage of waste arisings before and after a campaign;
- Composting rate in LA before and after campaign (BV82);
- Possible to chart impact via an increased recycling rate even though emphasis is upon minimisation (BV82);
- Waste disposal rate before and after campaign (BV82);
- Number of kilograms of household waste collected per head of population (BV84);

- Reduction in specific waste streams e.g. retailer programmes; and
- Tonnages managed by reuse / refurbishment projects.

Some Possible Soft Targets

- Public awareness of campaign gathered by a number of methods;
- Website hits;
- Telephone help-line calls;
- Feedback from surveys on proportion of population adopting waste minimisation practice;
- Leaflets distributed and additional ones requested;
- Numbers visiting events and displays;
- Number of school projects and number of parents involved;
- Opportunities to see (OTS);
- Proportion of target groups responding with positive waste minimisation choices; and
- Proportion of possible key decision makers and opinion formers that are members of campaign team.

Table 7.4: Possible KPIs by Waste Management BVPIs

Waste Management BVPIs	Possible KPIs for Waste Minimisation Campaign
BV82 a and b. % of household waste which is composted	Composting rate in LA before and after campaign Composting rate from selected collection rounds before and after campaign
BV82 c and d. % of household waste arisings that are landfilled	Waste disposal rate from experimental area before and after campaign
BV84. Number of KGs of household waste collected per head	Number of KGs collected in LA before and after campaign
BV86. Cost of waste collected per household. This may save time and cost by reducing collection time as number of receptacles reduced. This may mean fewer trips	Waste disposal costs before and after campaign Mileage of RCVs before and after campaign
BV90. % of population satisfied with waste disposal	Surveys may indicate how population respond to less waste to landfill

7.9   National and Local Targets

Waste Strategy 2007 discusses the need to continue to de-couple economic growth from waste generation. New targets for a greater focus on waste prevention have been put forward. This is through a new target (see section 1.3) to reduce the amount of household waste not re-used, recycled or composted from over 22.2 million tonnes In 2000 by 29% to 15.8 million tonnes in 2010 with an aspiration to reduce it to 12.2 million tonnes in 2020 – a reduction of 45%. This is equivalent to a fall of 50% per person (from 450 kg per person in 2000 to 225 kg in 2020).

The national strategy for Wales (2002) proposes to reduce waste in the public sector and also industry and commerce to 95% of 1998 figure by 2002, and 90% by 2010. There are also proposals for setting a target for home composting, if acceptable methods of measuring it can be determined.

The UK Government supported the Waste Minimisation Bill which became the Waste Minimisation Act in 1998. This enables Local Authorities to investigate what measures are needed to reduce, prevent or avoid waste in their areas, to take such steps as they consider appropriate in order to achieve that end, and for related purposes. Although

referenced in Guidance on Municipal Waste Management Strategies in 2001, most Local Authorities have focussed attention on planning to meet statutory recycling targets set for 2003/04 and 2005/06.

However, some Local Authorities in England have introduced waste stabilisation or waste reduction targets in their Municipal Waste Strategies. As an example, Lancashire proposed to reduce waste growth and stabilise at 1% per annum by 2005 by cutting growth in waste produced by individual households to 0.5% per annum and allowing for 0.5% growth in waste due to predicted increases in the number of households.

Gloucestershire has, perhaps, been one of the more ambitious County Councils to set waste reduction targets through to 2027:-

- 2003 – 2006   +3%
- 2007 – 2010   +2%
- 2011 – 2014   +1%
- 2015 – 2018   0%
- 2019 – 2021   -1%
- 2022 – 2025   -2%
- 2026 – 2027   -3%

Leeds also proposed a series of tapering waste reduction targets in its Integrated Waste Management Strategy (2001):

- 3% growth,
- 2% growth,
- 1% growth
- 0.5% growth.

Barnet (see section 6.7) has proposed:

Objective 1: Reduce the overall amount of waste from households:

- Limit waste per person to the 2004/05 level of 477 kg/pp per year by 2008
- Arisings per person to be reduced to 452 kg/pp per year by 2010
- Arisings per person to be reduced to 425 kg/pp per year by 2015
- Arisings per person to be reduced to 375 kg/pp per year by 2020

Blaby Council were very bold in their approach. How to implement such changes is the difficult part, especially with many households being given 240 litre wheeled bins. Blaby District Council in Leicestershire switched to wheeled bins in 2001, using powers under Section 46 of EPA 1990 to charge for containers. They introduced 140 litre wheeled bins for waste, together with a 140 litre green-lidded wheeled bin for recyclables on request, and garden waste is only collected in special pre-paid sacks. Recyclables are collected on alternate weeks. If the waste wheeled bin is filled before the end of the week, households can buy refuse sacks from the council or have a 240 litre wheeled bin for an annual rental fee.

Of the 37,550 properties served, only 7% were after 12 months renting the larger bin or buying refuse sacks in the. During the first year the amount of recyclables has risen by 55%.

Wealden in East Sussex has increased its recycling rate to over 50% by taking a firm line on not collecting waste mixed with recyclables. A number of Local Authorities now instruct their Refuse Collection Vehicles crews to leave behind any excess waste left alongside 240 litre wheeled bins.

7.10 Case Studies

7.10.1 Real Nappies

Disposable nappies represent between 2% and 3% of all household waste and 90% of these end up in landfill. The UK disposes around 3 billion disposable nappies, this is some 600,000 tonnes. A baby may get through 5,000 to 6,000 disposal nappies, whereas it would only use 20 to 30 modern washable ones. There are a range of benefits (Table 7.5)

Table 7.5: Benefits of Reusable Nappies and Nappy Laundry

Waste Management
West Sussex estimated that setting up a nappy laundry saved over 70 tonnes of waste in a 9 month period
Reusable nappy laundry services use 32% less energy and 41% less water than home laundry
The eco-footprint of service laundered nappies has been calculated as 1,600 m^2 against 2,300 m^2 for home (www.bestfootforward.com)
Cost
Northamptonshire County Council estimates that dealing with nappy waste costs over £1,100,000 per annum
Social
A 500 customer nappy laundry will create around 3 full time jobs

Measuring Success

Project progress could be measured using the following KPIs:

- Yearly uptake of scheme e.g. number of babies using reusable nappies;
- Quantity of waste prevented per annum. Typical baby uses some 2,000 disposable nappies per annum and the mass is some 400 kg of waste. So 1,000 babies using reusable nappies will save 400 tonnes;
- Cost per household per annum of delivering scheme;
- Cost saved in removing nappies from hospital clinical waste;
- Cost saved on collection and disposal by local authority;
- Cost saved by householder;
- Number of jobs created;
- Number of people trained.

Promoting Reusable Nappies

- Using reusable nappies on hospital wards enables parents to see the many advantages. In East Surrey, over 60% of parents tried real nappies when they knew they were available (www.wen.org.uk);

- Promote through Crèches, nurseries, playgroups and National Childbirth Trust (www.nctpregnancyandbabycare.com);

- Promote through childcare and nursery nursing courses (www.surestart.gov.uk);

- Emphasise the cost and health benefits. Home wash of reusable nappies can save a parent some £500 for one child per annum;

■ Provide a resource pack for the public and those seeking to commence a reusable nappy service. Some key contacts and case studies are shown in Table 7.6.

Table 7.6: Some Key Contacts and Case Studies

WRAP – www.wrap.org.uk (Tel: 0808 100 2040)
SureStart – Government Programme for child care – www.surestart,gov.uk
Women's Environmental Network – www.wen.org.uk / NappyPartnerships
Real nappy manufacturers – www.realnappy.com
Nappy laundry businesses – www.changenappy.co.uk
Northumberland Real Nappies – www.wrap.org.uk
Sustainable Wales – www.realnappies-wales.org.uk
Nappy finder, search for nappy services in UK - www.wrap.org.uk

■ Promote project to local business to encourage new ventures. A new business with some 200 customers paying some £8 per week would have an annual income of £83,200;

■ Promote project to local authority to gain funding.

> **Case Study**
>
> Oxfordshire County Council provided a £30 subsidy to reusable nappy users. After an initial nappy purchase by parents, £15 was given towards the second set and £15 for the third. This reduced the cost of kiting a baby out to only £40. It also provided publicity for the scheme and staff resources to support. Some £6,300 was spent on publicity in 2003 and £4,500 on incentive payments to public.

7.10.2 Home Composting

Objectives

Home composting campaigns must have objectives related to:

■ Raising awareness of the needs and benefits of composting and grass recycling;
■ Offering a range of subsidised bins;
■ Provision of on-going support.

SMART targets could include:

■ 60% of householders have home compost bin;
■ 70% of householders have no technical problems with provision;
■ 70% of householders with a problem were able to get immediate advice through telephone help-line.

Market Research

Main aims to include:

■ Establish attitudes to participation in home composting in given area;
■ Identify households interested in joining scheme;
■ Use Geographical Information System (GIS) to target householders with suitable gardens. A classification by ACORN types can also be added to enable planners to target the most likely householders (e.g. London Community Recycling and WRAP)
■ Targeting those who have tried but require technical support to overcome problems.

Partnership

A wide array of partners is available to work in this area. These include:

- WRAP;
- Bin manufacturers;
- Local resident groups;
- Composting Association;
- British Trust for Conservation Volunteers;
- Community Recycling Network.

Sourcing Bins

Determine number of possible bins required, based upon market research. In a typical area of some 50,000 households 25% may be targeted for initial contact. So an order of 10,000 bins is likely. These may be ordered in perhaps 3 or 4 phases.

It is vital to get at least 3 quotes from manufacturers and also enquire about payment terms and conditions. Some companies may include distribution in the cost. Attempt to use compost bins with a 100% recycled material content.

Charging

On the whole, it is better to charge for bins than give them away.

WRAP aims to provide compost bins for 1,500,000 households by 2007. There are 9 varieties of bins that are being monitored throughout the scheme. They range from plastic 150 litre bins to large plastic or woodbins (600 litres). In most cases householders will be charged £5 - £15 for their bins. Some pilot areas are given bins free.

There is a helpline and a number of specialist advisors with WRAP.

Promotions

To stimulate sales, promotional work will be required. This will include:

- one day sales;
- garden centre promotions;
- internet site promotions;
- sales in schools for parent groups; and
- try before you buy.

Long-term Support

Support can be given through:

- leaflets to each house;
- regular newsletters;
- telephone helpline;
- internet site;
- displays at retail outlets;
- farm shop and garden centre open days;
- school projects; and
- local experts who are project partners.

Costs

Main costs are:

- staff to organise, promote and deliver;
- purchase of bins;
- promotion;
- distribution;
- storage;
- telephone helpline and other householder support;
- office space for staff; and
- replacement, in early phase, of defective bins.

Options

Composting options include:

- Compost bins that rest on soil. Most common are 220 litres, range 120 to 600 litres, and prices are often £20 to £40;
- Digesters that are enclosed at bottom and top. Typically £40;
- Wormeries. They come in sizes from 80 litres to 200 litres. They are provided with colony of worms, bedding and drainage platforms. Prices from £35 to £60;
- Bokashi kits. These use micro-organisms to digest waste. Kits from £15.

Measuring Outcomes

Home composting has normally been measured in relation to soft quantitative targets. These include:

- number provided over given time;
- proportion of households who have purchased them;
- proportion of suitable households who have purchased them;
- number of people attending workshops etc;
- take data for an area where composting has been promoted for some time; and compare with other similar ones where it has not been (taking account of a range of issues).

WRAP have developed a model to calculate the tonnage diverted from landfill through home composting. This was developed primarily to allow home composting to contribute to individual Local Authority achievement of their LATS/LAS targets.

Using GIS, 4 household types were considered. These are:

- Level 4. Home composting to WRAP minimum standards with bin and support;
- Level 3. Home composting by other means;
- Level 2. Lapsed home composters;
- Level 1. Households that have never composted.

The model will estimate the minimisation impact of households moving from one level to another.

WRAP has an extensive list of excellent sites (www.wrap.org.uk). These include:

- Home Composting: a Public Guide;
- A Home Composting – Local Advertising and Promotion Toolkit;
- Useful Links.

7.11 Case Studies of waste minimisation / prevention on-line

From the Daily Mail: Googling a greener planet: searches for eco-sites rise 25 per cent (Mail 4th May 2007)

From an online community where you can give away your unwanted possessions to a guide to less-polluting cars, these are the most popular green websites on the internet. A report today shows that traffic on websites about the environment has increased by 25 per cent over the past two years. Top sites (Table 7.7) are the Environment Agency for England and Wales and the Freecycle Network - a localised online noticeboard that allows useful secondhand items to be passed on rather than thrown away.

The top five environmental search terms - words that are tapped into a search engine to find a website - are "freecycle" followed by "environment agency", "earth day" (the annual international day of action on the environment), "live earth" (the Wembley concert on 7 July featuring Madonna, which will raise money for environmental charities) and "global warming". Internet analyst Heather Hopkins said: "We have seen an increase in environmental websites and in search terms such as 'carbon footprint'.

The reason behind any increase in online activity is because of offline promotion, or news stories. People hear about these things and look for more information.

"Now the big challenge for the websites is to maintain momentum. They become popular because there is a buzz, but they need to keep that going."

Table 7.7: Top 20 environment websites visited last month in April 2007.

1. Environment Agency for England and Wales - Government news and advice on protecting the environment. environment-agency.gov.uk
2. Freecycle Network - Localised site that matches people with unwanted goods to others who want them. freecycle.org
3. BBC science and nature - News on the planet. bbc.co.uk/sn
4. Care2 - Environmentally orientated search engine. care2.com
5. RecycleNow - National recycling campaign website homepage. recyclenow.com
6. United Kingdom Freecycle groups' homepage - Directs users to local groups. uk.freecycle.org
7. BBC climate change experiment - Attempt to produce a forecast of the climate in the 21st century on your PC. bbc.co.uk/sn/hottopics/ climatechange
8. VCA car fuel data - Figures on fuel consumption and emissions. vcacarfueldata.org.uk
9. USGS earthquake hazards program - Geological surveys on the causes of earthquakes. earthquake.usgs.gov
10. The Guardian environment - News and features on the environment. environment.guardian.co.uk
11. Friends of the Earth Organisation that sets out to protect and improve conditions for life on earth. foe.co.uk
12. US Environmental Protection Agency - Leads America's environmental science, research, education and assessment efforts. epa.gov
13. Scottish Environment Protection Agency - Scotland's environmental regulator. sepa.org.uk
14. Woodland Trust - UK's leading conservation charity to protect trees and woodland. woodland-trust.org.uk
15. Treehugger - Advice on how to make your life more environmentally friendly. treehugger.com
16. Natural Collection - Shopping site for ethical products. naturalcollection.com
17. Earthday Network - Co-ordinating body for Earth Day environmental campaign. www.earthday.net

| 18. Centre for Alternative Technology - Promotes sustainablility. cat.org.uk |
| 19. NetRegs - Environmental guidance for small businesses. netregs.gov.uk |
| 20. Greenpeace UK - Investigates, exposes and confronts environmental abuse. greenpeace.org.uk |

7.11.1 Freecycle

The first UK Freecycle Group was set up in London in October 2003. There are now (July 2007) some 437 groups in UK with 800 659 members. The worldwide Freecycle Network is made up of many individual groups across the globe. It's a grassroots movement of people who are giving (and getting) stuff for free in their own towns.

Freecycle groups match people who have things they want to get rid of with people who can use them. Our goal is to keep usable items out of landfills. By using what we already have on this earth, we reduce consumerism, manufacture fewer goods, and lessen the impact on the earth. Another benefit of using Freecycle is that it encourages us to get rid of junk that we no longer need and promote community involvement in the process.

How does Freecycle work?

Everything posted must be free, legal and appropriate for all ages. When you want to **OFFER** something - whether it's a chair, fax machine, piano or an old door, simply send an email to your group.

Maybe you're looking to acquire something yourself? Post a **WANTED** message and a group member may just have what you're looking for. Alert the group with a follow-up **RECEIVED** email.

After that it is up to the giver to decide who receives the gift from the responses only they receive and to set up a collection time, and finally post an item **TAKEN** message.

You should now address the following Action Point, available in your workbook.

Action Point 7.0
Critically assess the approaches to waste minimisation which have been demonstrated. Identify other approaches to waste minimisation which could be utilised within your strategy

8. Measuring Waste Minimisation

8.1   Introduction

Measuring Household waste minimization / prevention is a complex activity that has only quite recently become a key issue in the UK.

Some impacts can be measured directly with a satisfactory degree of accuracy. However, a number can only be estimated and often have a lower degree of accuracy. There is also a range of measurement techniques ranging from direct mass calculations to social surveys.

Whatever means are used to measure waste prevention / minimisation, they must link to the objectives of the waste minimisation Action Plan. Above all else, they must be transparent and easily comprehended so that they can be used to engage members of the general public in a well designed campaign.

The OECD has carried out extensive theoretical work on waste minimization / prevention. This started with a major workshop on waste prevention and means to measure it (**see Additional resource 17; OECD: Measuring Waste Prevention**) and then in a major publication (**see Additional resource 18; OECD: Waste Prevention**).

8.2   Ways of Analysing Material and Waste Flows

There are a number of ways of analysing material and waste flows in a society. Table 8.1 below lists four approaches and identifies possible ways to measure changes in waste flows.

Table 8.1: Possible Ways to Measure Changes in Waste Flows

Approaches	Possible Measurement Techniques
1. Material Flow Analysis	Trends in material flows and their intensity relative to GDP
2. Eco-efficiency	Material Input Per Service Unit (MIPS)
3. Analysis of actions taken to foster waste prevention	Time series based on evidence of actions to implement waste prevention
4. Consideration of recycling and diversion rates	Waste prevention rates "similar" to recycling and diversion rates

8.2.1 Material Flow Analysis (MFA)

As its name implies, material flow analysis (MFA) is concerned with the amount and composition of the materials utilized at the various stages of productive activity, including extraction, processing, manufacturing, wholesale and retail trade, consumption and end-of-life treatment. The goal of many of these studies was to determine whether **dematerialisation** was taking place. Three key flows are:

- **Direct Material Input (DMI).** This includes all of the materials which enter into economic activities and so acquire a monetary value

- **Total Material Requirement (TMR).** This includes DMI plus **Hidden Flows**, that is the materials which are disturbed or utilized in the productive process but which never acquire a monetary value

- **Direct Produced Output (DPO).** This includes all materials which are "emitted" to the domestic environment.

8.2.2 Eco-efficiency

The World Business Council for Sustainable Development (WBCSD) has defined eco-efficiency as "…the delivery of competitively priced goods and services that satisfy human needs and bring quality of life while progressively reducing ecological impacts and resource intensity throughout the lifecycle." This becomes clear when one considers the **seven elements of eco-efficiency identified** by the WBCSD:

- reducing the material intensity of goods and services;
- reducing the energy intensity of goods and services;
- reducing toxic dispersion;
- enhancing material recyclability;
- promoting sustainable use of renewable resources;
- extending product durability; and
- increasing the service intensity of goods and services.

Based on these elements, eco-efficiency involves quantitative and qualitative aspects of waste prevention as well as waste minimisation through increased recyclability.

8.2.3 Analysis of Actions Taken to Foster Waste Minimisation

The goal of waste minimization / prevention policy is to foster actions which lead to waste prevention. Such actions include the following:

- expenditures on waste prevention related activities, including education;
- passage of regulations such as Extended Producer Responsibility, which address waste prevention through re-use or other requirements within them; and
- adoption of economic instruments such as unit pricing, which lead directly or indirectly to waste prevention.

Unit pricing refers to an arrangement under which a household is charged for waste service, based on the amount of waste that is set out. In the U.S., for example, there are thousands of communities which have unit-based pricing and many, many thousands which do not. Thus, cross-sectional statistical analysis can be used to attempt to determine the impact and, in more refined studies, the price elasticity of waste generation with respect to unit pricing. To date, however, the results of these studies have proved to be somewhat controversial. Some find that unit pricing enhances recycling and increases waste prevention. Others suggest that conclusions of this type reflect model mis-specification and that, in fact, only waste prevention, and not recycling, is actually enhanced.

A Eunomia report (available online from http://www.eunomia.co.uk), argues that the UK is out of step with the majority of other developed nations. Other EU Member States (and other OECD countries) are increasingly introducing charging. The reasons given are - charging generates a range of benefits, more and less tangible, helping to promote responsible behaviour on the part of households and improving the efficiency of collection systems.

8.2.4 Diversion and Recycling Rates

Progress in waste minimisation can be tracked through what are referred to as "rates." Here two examples may be useful:

- **Recycling Rates.** These are commonly used, in the U.K. and elsewhere, to indicate the portion of a locality's or a region's MSW stream which is being recycled. Recently, the U.S. EPA has suggested uniform procedures which would make such recycling rates more useful at the national level;

- **Diversion Rates.** These are used in a variety of settings to indicate the portion of a waste stream which is managed through waste minimisation as opposed to disposal. Canada's Generally Accepted Principles (GAP) describes a uniform approach to the development of such rates.

Recycling and diversion rates are attractive types of indicators, particularly if they can be developed in a fashion which permits aggregation to the national level. Such rates are easily understood. Using them, one can see whether local progress on waste minimisation is "satisfactory" compared to national-level goals. One might ask if it is possible to devise a **Waste Prevention Rate** (WPR), analogous to recycling rates and diversion rates. The answer is "yes."

How one might define a WPR depends on whether one has an acceptable method for **measuring waste minimisation (prevention)**. If so, a WPR can be defined based on the amount of waste generated **(W)** and the amount prevented **(WP),** as follows:

$$WPR = \left(\frac{WP}{W + WP} \right) x\, 100$$

This formulation of a WPR follows the standard definitions of recycling and diversion rates quite closely. For example, Canada divides the whole of waste managed into that diverted (DIV) and that disposed (DIS). Canada's Waste Diversion Rate (WDR) is then defined as follows:

$$WDR = \left(\frac{DIV}{DIS + DIV} \right) x100$$

In the proposed definition of WPR, W and WP assume the roles played by DIS and DIV in Canada's WDR.

8.3   Tracking Waste Minimisation

Development of WPI's requires the selection of a general approach to waste prevention. There are two basic options:

- one can focus on **absolute** reductions in waste; and

- alternatively, one can consider reductions **relative** to underlying growth in population, the economy, or some other factor.

The relative approach takes into account developments which can distort the evaluation of waste prevention efforts. For example, Population or GDP might fall, resulting in less waste generation without any waste prevention being undertaken.

There is a synergy between the absolute and relative approaches to waste prevention, showing how analyses focused on relative waste prevention can help one understand which might be required to produce absolute reductions.

8.3.1 Counter Factual

A key feature of waste minimisation, which distinguishes it from the rest of waste management, is that it addresses waste that isn't there, rather than waste that is there to be managed. This makes it impossible to directly measure waste prevented as one measures waste recycled, for example.

Consider reuse, the aspect of waste prevention which appears to be most directly measurable. One can, of course, measure what is reused. However, one can't measure the material whose creation is avoided because of that reuse. Instead, one must construct a **counter-factual** that is an estimate of the waste that would have been generated without the reuse. It is the counter-factual which provides information on the waste prevented.

8.3.2 Drivers for Municipal Waste Increases

The generation of MSW is related to the level of human activity and particularly to final consumption of products and services. These considerations suggest two drivers for MSW: Population and Private Final Consumption (PFC) which is defined as follows:

Private Final Consumption: the sum of the outlays of resident households on new durable and non-durable goods and services, less their net sales of second-hand goods, scraps and wastes, plus the value of goods and services produced by private non-profit institutions for own use on current account; expressed at 1991 price levels and purchasing power parities.

How might one decide on a driver for MSW? Where there is sufficient historical data, one can test statistically to see whether population, PFC, or some other choice, such as Gross Domestic Product (GDP) provides the **best explanatory variable** for MSW. Studies of this sort have been conducted by the U.S. Environmental Protection Agency (EPA). The results were as follows:

- Population, PFC, and GDP all explained the historical data on MSW very well. Single variable equations using each variable had R^2 (correlation coefficient) values of .95 or above; and
- Based on R^2 values, year-to-year changes in GDP and PFC explained year-to-year changes in MSW much better than year-to-year changes in population. For year-to-year changes, PFC performed a bit better than GDP.

Based on such statistical analyses, the U.S. EPA decided to use PFC as the driver for its basic analyses of waste prevention for MSW.

The European Environment Agency (EEA) showed that, on a statistical basis, PFC does provide a basis for an explanation for MSW. EEA researchers were able to develop models which used data on specific components of PFC, as well as components of GDP linked to final consumption to explain and forecast the generation of MSW, Household component of MSW and specific waste materials including glass, paper, and cardboard included in MSW.

PFC, or parameters closely related to it, provides a good statistical explanation for the generation of MSW. However, this does not mean that PFC is the only driver to use when considering relative waste prevention for MSW. For **certain policy purposes** it may be useful to consider population as a driver. To see why, it is helpful to use the following simple identity:

$$MSW = POP \times \frac{PFC}{POP} \times \frac{MSW}{PFC}$$

In this identity, POP is population, PFC per capita provides a measure of affluence, and MSW per unit of PFC captures the way in which technology intervenes between consumption and waste generation, through such things as a shift from glass and steel to aluminium and plastic beverage containers, and the replacement of records first by compact disks and then by downloads directly from the Internet.

In thinking about waste prevention, population change is usually treated as **exogenous**; that is, outside the waste policy framework. Technology, on the other hand, is clearly an area on which waste prevention policy and related actions might focus. A key question is how to treat affluence. There are two options, each of which leads to a different choice of driver for MSW and a different indicator of relative waste prevention:

■ one can accept growth in both population and affluence as exogenous factors driving MSW generation. This supports the use of PFC as the driver of MSW. The resulting trend in the intensity of waste generation provides an indicator of "technical progress' alone; and
■ one can take population as the driver. This puts the effects of affluence and technology into the intensity of waste generation. The resulting trend in the intensity of waste generation provides an indicator of the extent to which improvements in technology are sufficient to offset the effects of the growth affluence.

Table 8.2 shows OECD-wide trends in MSW generation, PFC, and population. The trends are all based on a baseline value of 100 from 1980. Values are shown for 1985, 1990 and 1997. Table 8.2 also provides the trend Values for MSW per unit of PFC and MSW per capita. The data show that, through 1997, there was progress in "technology" indicated by the declining trend in the intensity of waste generation per unit of PFC. This decline was sufficient to offset the effects of the growth in affluence, as indicated by the stabilization in the trend for intensity of waste generation per capita. However, progress was not sufficient to produce absolute waste prevention, as indicated by the continuing growth in the trend for MSW.

Table 8.2: OECD: Trends for MSW and Related Parameters (**see Additional resource 17 and 18**)

	1985	**1990**	**1997**
MSW	109	130	138
PFC	114	135	157
Population	104	108	114
MSW per Unit of PFC	96	96	88
MSW per Capita	105	120	121

8.4   Setting Targets

Setting targets makes waste prevention for a particular waste stream more visible and what is noticed often is often what gets addressed. Target-setting can focus waste managers and the public on well-defined waste prevention objectives and then provide

them information on the progress (or lack of it) associated with their efforts to meet these objectives.

The setting of a waste prevention target for a specific waste stream can be based on the selection of a measure for absolute or relative waste prevention for that stream, and then the specification of a goal and the date by which it will be achieved.

There is an obvious role for the indicators and indices; they can provide the measure of waste prevention upon which target-setting is based. It is easy to provide examples of actual waste prevention targets developed using indicators and indices discussed in this chapter.

Absolute Waste Prevention as Indicated by Waste Steam Trends.

The Finnish National Waste Plan required that the waste generated in the year 2000 should not exceed that generated in 1994. This target was achieved.

Relative Waste Prevention as Indicated by Trends in the Intensity of Waste Generation.

The U.S. EPA has set 1990 per-capita generation of MSW as a target for per-capita generation in 2005. This requires waste prevention because current per-capita generation is above 1990 levels.

Indicators and indices developed using the driver / intensity framework can also provide much of the analytical basis and support on which target-setting depends. It is not always essential to use tonnage when formulating waste prevention targets. Other indices provide a basis for a broader target-setting effort. Setting a target is a particularly attractive option if a "reasonable" numerical goal can be specified. Determining what is reasonable requires forecasts of the likely level of waste generation in the future. Monitoring and reporting progress (or the lack of it) toward stated goals is an essential feature of the targeting process.

8.5   A UK Perspective

8.5.1 New Targets for England

The new Defra targets (Defra, 2007) enable waste minimisation measurements for MSW to be approached for the first time (Table 8.3).

Table 8.3 New Waste Strategy 2007 targets for England.

	2005	2010	2015	2020
Household waste after re-use, recycling and composting (m tonnes)	18.6	15.8	14.3	12.2
% reduction from 2000	16%	29%	35%	45%
Equivalent per person figures (kg)	370	310	270	225
% reduction from 450kg per head in 2000	18%	32%	40%	50%
Household re-use, recycling and composting	27%	40%	45%	50%
Municipal waste recovery	38%	53%	67%	75%

8.5.2 Tracking Waste Arisings

Waste Performance Indicator (WPI) 1: kg of household waste per head of population per year

This is given by the household waste collected by the Waste Collection Authority (and WDA) divided by the number of residents.

Household waste means all waste collected by WCAs plus all arisings from Civic Amenity (CA) Sites (WDA) and waste collected by third parties for which collection or recycling credits are paid.

Best Value Performance Indicator 84 concerns:

"kg of household waste collected per head."

This deals with waste that includes waste dealt with by the community sector. The WPI used above does not include the waste collected by the community sector when credits are paid.

Using this indicator we can:

■ Compare measured waste arisings per head before and after a waste minimisation campaign; and
■ There should at least be a reduction in growth rate not necessarily an absolute reduction.

We need to (e.g.):

■ have accurate base line data for several previous years;
■ choose carefully the time frame over which to compare. ideally it should be year compared to year to avoid the issue of seasonal waste variation;
■ take account of a number of contributing factors such as variation in weather patterns year on year;
■ consider whether houses have been turned into flats, increasing the number of dwellings and population in a given collection round; and
■ consider whether in a University City an area has been turned into a student area, so radically changing the population mix.

WPI 2: kg of household waste per household
This is an alternative to WPI 1 and is based upon the quantity of arisings from each household in a given area. Trends will be similar to WP1 and can be presented year on year.

WPI 3: total arisings per household per unit of personal expenditure (or GDP)
This method eliminates the variation caused by expenditure / GDP growth. It also eliminates the variation caused by increasing numbers of households. It can add insight as it suggests how wasteful goods and services are, not just the mass of waste arisings.

There can be problems with this approach, as growth in waste arisings are in region 2.5 to 3.0%. Linking to GDP can result in variation of this value merely because of the method used. This WPI should always be used in collaboration with others such as WPI1 and WPI2.

8.5.3 Using a Control Area

This method uses one Local Authority (or other Unit) not involved in a waste minimisation programme, as a control against others which are involved are compared.

The control areas could be:

- District or Boroughs that are within a given County, same WDA;
- District and Boroughs within different Counties, different WDA;
- District and Boroughs within different Counties and different Regions; and
- Unitaries within a given Region.

There are problems with this method:

The control area must be very similar to the experimental area. There needs to be a similar mix of
housing stock, social class, unemployment, urban / rural mix and historic waste management practice. In many cases Deprivation Index will be a key comparator.

It is also vital to ensure that the populations are not being significantly effected by a number of non Local Authority campaigns. These could include:

- community groups;
- schools projects; and
- retail projects.

Typical Action Plan for Control Area Research:

- develop a range of Objectives and Indicators for programme. Carry out a SWOT analysis to refine programme. Select control area, citing reasons;
- obtain data for baseline for at least 5 years preceding present;
- process all data to produce useful information ;
- commence waste prevention campaign in areas except control area;
- whilst campaign operating, do not change waste management system in control area;
- obtain data on any parallel activities to planned campaign in experimental area;
- obtain quantitative and qualitative data for experimental area. Analyse data to take account of any unforeseen changes in circumstances. Compare quantitative with control area; and
- disseminate results widely to range of players, in particular those sections of population that have been targeted in the campaign.

8.5.4 Measuring Individual Activities

A number of waste minimisation projects can occur in a given area at the same time, driven by a range of players, not all of whom work closely together in a holistic manner. Often, industrial / commercial waste minimisation projects occur without any synergy to household projects, e.g. Furniture Turnarounds, School Projects, in a given Local Authority area.

Data should also be collected from a range of individual projects as well as for particular components of the waste stream. There are potential problems here, as all data gathering procedures must obey the same protocols to ensure that data is consistent.

Some typical activities are:

Community Re-use
This can include:

- charity shops (donations);
- exchanges: goods and services;
- community re-paint;
- children scrapstores;
- food share projects: Shops donating food near end of life; and
- computer Re-use.

Home Composting (e.g. WRAP)

Waste Aware Shopping (e.g. WRAP)
Working with retailers can help change purchasing decisions and data can be obtained yearly on a range of issues such as a `bag for life`.

Unwanted mail
Unwanted mailings can be reduced by up to a third in weight if registered with Mailing Preference Service.

Services
These can include:

- real nappy laundry service;
- library services – e.g. toy library;
- leasing of goods; and
- product refill.

Retailers

The Courtauld Commitment is vital here as retail sector seeks to minimise waste by:

- design out packing growth by 2008;
- deliver absolute reductions by 2010; and
- following WRAP Business Plan to secure an 80 000 tonnes reduction in packing waste by 2010 and 10 000 tonnes reduction in household food waste.

Each store can be tracked and the amount of say packaging per person purchasing can be assessed.

8.5.5 Declared Awareness and Behaviour

Householders can be surveyed / questioned about their waste minimisation practices before and after a campaign.

You will need to carry out Desk Research to:

- obtain data on, for example, Census Statistics; and
- general information on previous activities.

Surveys can be conducted in a number of ways. These include:

- door to door canvassing;
- public place surveys;
- postal surveys; and
- telephone surveys.

This type of research may be considered to be qualitative and can help determine:

- public understanding;
- personal cost in time and money on waste minimisation;
- barriers to waste minimisation;
- knowledge requirements to stimulate pro-environmental behaviour; and
- purchasing to reduce waste.

There are a number of rules that must be adhered to in such surveys they include:

- obtain a representative sample; and
- carefully design questionnaire using expert guidance.

Monitoring and evaluation are necessary to measure the effectiveness of campaigns and thus demonstrate return on investment of time and money. WRAP have produced a Monitoring and Evaluation toolkit / manual which is available online. (http://www.recyclenowpartners.org.uk).
The Monitoring and Evaluation document aims to provide local authorities with practical, easy-to-use information on how to develop effective monitoring and evaluation programmes, and how to execute these programmes. Key performance indicators are grouped into three main categories:

- usage of recycling services: participation and tonnages;
- awareness change in the target audience: questionnaire surveys; and
- marketing and PR activities: opportunities to see, monitoring helplines and websites.

8.6   Ecological Footprint

This is the single simplest measure of our global impacts. The measure used is an Ecological Footprint, expressed in `global hectares` (gha) per person, and is the area requirement for a given consumption.

Four basic productive areas are used in ecological footprint calculations. These are:

- bioproductive land, arable, pasture etc;
- bioproductive sea;
- energy land i.e. forest land; and
- built land.

8.6.1. South East of England

The ecological footprint of the average person in the South East Region of England is around 7 gha. The population would therefore require 20 times the actual area in the South East to achieve the same standard of living. If the same values were used across the world then the whole population would require 3.5 planets. This shows that the gha per person varies markedly from place to place.

Factor Four is a means of reducing the ecological footprint. It means doubling resource efficiency and halving resource use. This would give a 75% reduction in, for example, energy and materials in the South East.

Using ecological footprints it is possible to develop strategies that target areas where there will be the greatest impact at the least cost. In the South East this could be:

- the food sector is the largest single impact at 25% of EF. There is great scope for localising food production and reducing energy consumption;

- manufactured durables and consumables have opportunities for process efficiency and supply chain management; and
- a `greening` of public sector purchasing within an integrated regional strategy for resource management will have a noticeable impact. This will require co-ordination between retailers, packers, producers and others.

In the Isle of Wight, it has been calculated that a waste minimisation campaign that reduced Household and commercial waste arisings would result in a 0.31 gha reduction. This is a significant area.

8.6.2 Northamptonshire

For Northamptonshire (**see Additional resource 19**) waste is a key issue:

Similar to the rest of the UK, the Northamptonshire ecological footprint exceeds the average sustainable 'earthshare' of 1.8 gha per person. Thus, if everyone on the planet consumed as much as the average Northamptonshire resident we would require over two and a half planets to sustainably support global resource consumption.

The ecological footprint of Northamptonshire is also compared to the biocapacity of the region. This illustrates how the higher availability of arable land in Northamptonshire, despite a higher population density (314 people per km^2), results in a higher local biocapacity. The total biocapacity of Northamptonshire is 1.76 gha per person, compared with a resident's ecological footprint of 4.90 gha per person. This can be compared to the UK's population density of 244 people per km^2 and a local biocapacity of 1.53 gha per person.

Northamptonshire's land area is not large enough to sustain local consumption patterns, and in theory would need to be 2.6 times larger in order to do so.

To calculate the ecological footprints of the Northamptonshire districts, the footprint of Northamptonshire is adjusted according to the various district datasets. The coverage of the district datasets varied by component. It was good for energy, materials & waste and land use. The ecological footprints of the various districts of Northamptonshire varied between 5.31 gha per person (Corby) and 4.60 gha per person (Daventry). This variation was mainly driven by the variation in **waste produced and the amount recovered** (recycled or composted), which is used to proxy overall material consumption.

Ecological footprint may be used to track the impact of waste minimisation campaigns. It can be an indicator to feedback to the public.

8.7   Carbon emissions

The carbon indicator relates to the total impact of waste treatment in the given year. For example, if 2 tonnes of waste were landfilled, releasing 1 tonne of carbon dioxide equivalent (over 100 years), and 2 tonnes of waste were recycled, reducing carbon dioxide equivalent emissions by 1.5 tonnes (through offset primary production), the net impact of waste treatment in that year would be to reduce global greenhouse gas emissions by 0.5 tonnes.

On this basis, the impact of improved practice for waste treatment in England for 2006/07 was to reduce greenhouse gas emissions by 7.2 million tonnes carbon dioxide equivalent. Based on modelling of expected policies and waste growth, this benefit is forecast to rise to a saving of at least 16.5 million tonnes carbon dioxide equivalent in 2019/20.

These are the benefits of treating waste only. In addition to this there are benefits for waste prevention the preliminary analysis of which suggests further significant carbon savings. With a waste prevention of some 0.25 million tones then some 0.5 million tones of CO_2 equivalent are saved for C/ I wastes. MSW saves even more with a reduction of 0.8 million tonnes the CO_2 equivalent is 1.8 million tonnes.

Can carbon reductions be used to communicate to the public the outcomes of a waste minimisation campaign?

8.8   Cost benefit (see Additional resource 3)

Assume a Local Authority with 300,000 tonnes of waste (250,000 households) reduces waste arisings by 3% through a well-designed campaign.

This is some 9,000 tonnes per annum.

Assume that waste costs some £80 per tonne to collect, handle and dispose of.
This means that the Authority is saving £720,000 per annum.
8.8.1 Some Costs and Benefits

The above is a crude measure of the benefits but it must be remembered that there are also costs. Table 8.4 contains some likely costs and benefits for a hypothetical Local Authority.

Table 8.4: Some Likely Costs and Benefits for a Hypothetical Local Authority

Activities	Avoided Waste Management Costs at £80 per tonne	Capital Ex.	Annual Cost	Net Annual Benefit
Waste Aware Shopping	£120k to £240k	-	-	£120k to £240k
Unwanted Mail	£48k to £96k	-	-	£48k to £96k
Home & Community Composting	£240k to £720k	£200k	£60k	£180k to £660k
Re-use / Refurbishment	£240 to £480k	£500k	£120k	£120k to £360k
Product Services	£120k to £240k	£100k	£50k	£70k to £190k
LA Co-ordinator	-	-	£25k	-
WP Communications Campaign	-	-	£200k	-
Total	£770k to £1,800k	£800k	£455k	£315k to £ 1,345k

8.8.2 Payback Period.

Campaigns must be carefully costed to make the best available use of funding. One measure often used to account for funds is a simple payback period. This is defined as:

12 x Capital Expenditure / Net Annual Benefit

Taking the best case scenario for Home and Community Composting, an expenditure of £200k may lead to a Net Annual Benefit of £660k. This will suggest a payback period of:

12 x £200,000 / £660,000 = 3.6 months.

However, it is important to remember that all costs must be taken in to account, as the possible range of Net Annual Benefit – the worst case scenario taking Capital Expenditure only as a cost is:

12 x £200,000 / £180,000 = 13.3 months

Adding all other costs will make the Payback Period even longer. When the time exceeds, for example, 6 months, there is a need to switch to more sophisticated accounting systems that take into
account the decreasing value of money with time.

8.9   Funding for Waste Awareness Campaigns

A number of waste awareness campaigns have now reported. Data for some projects is included in Table 8.5.

Table 8.5: Cost for Some Waste Awareness Campaigns

Campaign	Budget (£)	Population (000s)	Households (000s)	Mgt. Costs (£)	Advertising Costs (£)	Research Costs (£)
Devon	1,169k	1,074	458	24k	1,104k	42k
East Anglia	668K	5,769	2,385	111k	532k	25k
Glos.	631k	574	240	177k	418k	36k
Manchester	414k	2,482	1 040	26k	353k	35k
Wales	700k	2,903	1 209	21k	656k	23k

From this data it is possible to calculate the spend per head of population and spend per household for each campaign.

It can then be asked whether spend per head of population and per household are sufficient to meet objectives. It is informative to compare and contrast the management costs and research costs for each campaign. Are they a sufficient proportion of the budget? Some recent research suggests that management costs should be at least 8 - 10% of budget and research costs, to help design superior future projects, should be at least 5 - 8%. Additional data is found in Table 8.6

Table: 8.6: Example Costs for Waste Awareness Campaigns.

Campaign	Budget (£)	Spend per Head (£)	Spend per Household (£)	Mgt. Costs % of total	Advertising Costs % of total	Research Costs % of total
Devon	1,169k	1.08	2.55	2.0%	94.5%	3.5%
East Anglia	668K	0.11	0.28	16.6%	79.7%	3.7%
Glos.	631k	1.09	2.62	28.0%	66.3%	5.7%
Manchester	414k	0.16	0.39	6.2%	85.3%	8.5%
Wales	700k	0.24	0.57	3.0%	93.7%	3.3%

There is a wide diversity of spend!

East Anglia had a large regional project that was `Slim Your Bin`. This was a more general waste campaign that was perhaps lacking in focus for a waste minimisation campaign. In the future these general campaigns will have limited value.

Devon was better resourced and in one County only. Its theme was ` Do Not Let Devon go to Waste`. It was more focused with the resources to make a clear impact.

Research suggests that the spend per head of population needs to be greater than £1.50 for a highly focused, hard hitting campaign.

There is a wide divergence of spending on management cost, advertising and research.

Devon gave too small a proportion of total budget to management, as did Wales. Unless management is well resourced, there are likely to be major problems that are unlikely to be resolved correctly, as there are not the resources available to generate the expertise required.

Research is vital if we are to determine best practice. On the whole there has been insufficient emphasis upon this. There is need for guidelines that make clear what research is required to help determine best practice.

8.10 Some Cost Calculations Associated with Waste Minimisation Campaigns

8.10.1 Advertising Value Equivalent (AVE)

AVE is measured in column inches for an article or story printed in a newspaper at no cost to the project. The cost of this is then determined as if the project had to pay for the article / story. It has been found that the public are more likely to trust a report by a newspaper rather than an advert placed by a project.

It is suggested that to find the real value of an article / story there is a need to multiply the cost by a factor of 3 as a weighting to recognise the public's distrust of an advert and greater trust for a report written by a recognised journalist.

Project A has had 12 articles / stories written about it by local press. The data is found in Table 8.7.

Table 8.7 Data on Project A.

Number of Articles	Column inches per Article
3	4
3	6
2	7.5
2	10
2	12

At a cost of £80 for 2 column inches, calculate the AVE for the project.
There are 89 column inches at £40 per inch. That is £3,560.
Multiply by 3 = **£10,680**

8.10.2 Opportunities To See (OTS)

OTS is determined by obtaining the audited official circulation figures of a title. After that, it is necessary to calculate the readership figure – this is based on the assumption that a newspaper or magazine is read by 3 people.

In City A (population 100,000) a waste minimisation project runs a marketing campaign in local newspapers and magazines. The data (Table 8.8) is:

Table 8.8: Data for City A.

	Free Newspaper A	Free Newspaper B	Magazine C	Magazine D
Circulation	50,000	20,000	20,000	30,000
Number of articles	2	1	2	1
Number of total column inches	10	12	12	10

It is possible to calculate the OTS for the campaign. The total is the circulation x number of articles x 3 = **570,000**;

The OTS per head of population. This is 570,000 / 100 000 = **5.7.**

Many OTS have a value of around 10 - 14 for a waste campaign. What could be done to enable this project, at no extra cost, to obtain those figures? Apart from using newspapers and magazines, the whole range of media could be used. This would include posters in public places, publications in libraries, publications for school children and their families and other media such as radio and television.

What is the AVE for the campaign, assuming same costs as for A? The number of column inches is 44. At 40per inch this is = £1,760. Multiply by 3 = **£5,280.**

8.10.3 Summary

A 3% to 7.5% reduction is possible for well designed waste minimisation campaigns.

To obtain these figures the campaigns need adequate funding and partnerships that contain all the key local, regional and national partners.

Spend per head of population must be in excess of £1 per head of population (Table 8.6) per annum, and probably in the region of £1.50.

You should now address the following action point, available in your Workbook.

Action Point 8.0
Critically analyse different methods for the measurement of waste minimisation

9. Planning a Waste Minimisation / Prevention Strategy

The efficient planning of a waste minimisation / prevention strategy (**see Additional resource 13 and 14**) for a given area / situation is vital to the success of the strategy (**see Additional resource 3**). Each waste minimisation programme which has been implemented should reflect the needs and specific objectives which have been highlighted at the initial stages. The following section will look at the development of a generic strategy which may be adapted to any situation.

Research into waste minimisation programmes suggests that there are 6 key steps:

1. Conduct an initial review;

2. Establish a core team;

3. Prioritise options;

4. Plan programme;

5. Implement the programme;

6. Review progress.

9.1   Step 1: Initial Review

There are several key questions which should be addressed in the initial stages of a strategy. The answers to these specific questions should then form the basis of your strategy, enabling the formulation of objectives and methodologies required to enable the successful planning and implementation.

Examples of questions:

■ What is the geographical area in which the waste minimisation strategy will apply?
■ What is the quantity of household waste which is currently being generated?: per household? variations in communities?
■ How do other LAs compare? (Critically review existing practices utilising available data).
■ How are existing waste minimisation activities assessed within the area? (The development of a checklist incorporating these activities may provide useful information as to the location, uptake and success).
■ Are there any other potential partners who may desire to be involved in the consultation, planning or implementation phases? (Examine the potential involvement of community groups, retailers and manufacturers, schools, waste companies to name a few. This may vary from area to area).
■ What are historical waste arisings for area?
■ What recent public attitude surveys concerning waste and related issues have taken place?
■ How do similar WCAs and WDAs compare? Historical trends in these?

- What supporting partners are available from a range of sectors (Community Recycling Services), range of Government (local, regional (Regional Development Agency), national etc (DEFRA)) and range of functions (e.g. Facilitators (Business Link) , Service Providers, Regulators, WRAP)?
- What funding is available? What sources of funding could be applied for in future (e.g. Community Sector, WRAP, sale of goods)?
- What is delivery capacity in present team? Is expertise available internally or has it to be bought in?
- What type of waste minimisation programme? What are waste streams? What are time-scales?
- Is programme in line with local, regional and national strategies?
- Are objectives SMART?
- Is there the internal research capacity to evaluate programme outcomes and produce a detailed final report that will add to national debate?

It should be noted while these questions are specific to Local Authorities and household waste they are applicable in any given situation. The overall aims of the strategy should be evaluated when developing the initial questions which will eventually form the basis of specific objectives.

You should now address the following action point, available in your Workbook.

Action Point 9.0
In addition to the questions highlighted in this section, what other questions may be required in the formulation of specific objectives?

9.2   Step 2: Establish a Core Team

The working group should have a project co-ordinator who is also the project champion. This person needs to be dedicated to the waste minimisation strategy and requires expertise, seniority and above all great enthusiasm.

If the programme is going to be successful then involvement of individuals from relevant groups is vital from the beginning. Working partnerships become especially important as the strategy develops different initiatives to meet the overall aim, and also provide the range of expertise which is essential in the planning and implementation phases (Table 9.1). The development of partnerships and links can also provide the basis for linking economic regeneration, social and environmental goals.

Table 9.1 Examples of Possible Stakeholders and Partnerships

Local Public Sector	Local authorities waste management community development leisure parks staff economic development library services social services education Training organisations Schools, college and universities Business support organisations
Local Communities	Community Groups Not-for-profit groups Parish councils Resident committees

	Consumer groups
Local Business	Waste management companies Manufacturers and retailers
National Bodies	WRAP Environment Agency DCLG Envirowise

9.2.1 Engagement and Waste

Stakeholder engagement in the waste sector is driven from several directions, e.g. the need to meet targets and policies, but there is an underlying fundamental need to involve communities in responsibility for the decisions made within society and in the use of resources. Engaging local communities can help provide a greater understanding of local responsibilities in the minimisation of waste and can help in the formulation of solutions and decisions for waste reduction at source.

Targets drive the need to improve, change and expand the waste infrastructure at local and regional levels e.g. Waste Strategy 2007 for England: "Wise about Waste", the National Waste Strategy for Wales all set a series of targets which will meet the requirements laid out in the Waste Framework Directive, EU Waste Strategy, the Landfill Directive and the 6th Environment Action Programme.
If local engagement is done well there is a significant potential to find solutions that communities will support, based on decisions that involve local people and businesses taking some responsibility for their own waste and resource use.

There is also a push from the European Union, as a signatory to the Aarhus Convention, to ensure people's right to participate in decisions on some environmental issues including the waste sector (Box 9.1).

Info Box 9.1
THE AARHUS CONVENTION
The UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters was adopted on 25th June 1998 in the Danish city of Aarhus at the Fourth Ministerial Conference in the "Environment for Europe" process.
The Aarhus Convention is a new kind of environmental agreement. It links environmental rights and human rights. It acknowledges that we owe an obligation to future generations. It establishes that sustainable development can be achieved only through the involvement of all stakeholders. It links government accountability and environmental protection. It focuses on interactions between the public and public authorities in a democratic context and it is forging a new process for public participation in the negotiation and implementation of international agreements.
The subject of the Aarhus Convention goes to the heart of the relationship between people and governments. The Convention is not only an environmental agreement; it is also a Convention about government accountability, transparency and responsiveness.

9.2.2 Principles of Effective Engagement

The following principles are taken from NRWF (**see Additional resource 3**) Best Practice Guidelines on Public Engagement for the Waste Sector:

1. Inclusiveness: encourage the participation of all stakeholders who have an interest in or would be affected by a decision. Make particular efforts to involve the unaffiliated, minorities, the marginalised and the silent majority.

2. Transparency, Openness and Clarity: ensure stakeholders are given al the information they need. Tell them where the information is lacking or things are uncertain. Indicate clearly what they can or cannot influence by contributing and provide an indication of next steps.

3. Independence: using a neutral convenor and independent facilitators is sometimes essential in gaining the confidence of the stakeholders, especially if conflict arises. It is impossible for a sponsoring organisation, whether local authority or private company, to facilitate an independent process and the attempt to do so may in itself arouse suspicions about the integrity of the process.

4. Commitment: show respect for stakeholders by giving engagement the priority and resources it deserves.

5. Accessibility: provide different ways for people to become involved.

6. Accountability: as soon as possibly after the end of the engagement period respond to participants with an account of how and why their contributions have or have not influenced the outcome and ensure there are routes for follow up, including reporting on final decisions, strategies and / or implementation plans.

7. Resourcing: good engagement processes need both times and money. Running out of either can actively undermine everything previously achieved. Spell out the resource implications at the outset and be wary of starting what cannot be properly completed.

8. Productivity: the ultimate purpose of all engagement is to improve things for all concerned. Exactly how the process will do this needs to be clear from the outset so that nobody wastes precious time or resources. Equally the process should be thoroughly evaluated when it is completed to measure achievements against ambitions.

9.3   Step 3: Prioritise Options

After the initial review of waste minimisation activities in the area, it is vital to assess shortfalls in provision and to critically analyse existing provision in order to develop objectives which will form the backbone of an essential waste minimisation strategy.

The methods of the assessment can range dependent on outcome. A simple checklist may be employed purely to provide information which will ascertain the gaps and effectiveness of the existing provision. Perhaps an exercise involving all members of the group can be employed for a "brainstorming" session which can result in the prioritisation of options. The ideas from the session can then be formulated within an Action Plan from which the objectives will be derived.

9.3.1 Prioritising Objectives

Gap Analysis
Knowing what waste minimisation activities have taken place, are taking place and are planned to take place, it is possible to carry out a gap analysis and identify opportunities for improvement. Table 9.2 contains a typical list of key areas that should be completed.

Table 9.2 Examples of Key Issues for gap analysis

Activities	Issues	Present Effectiveness Score*	Future Possible Effectiveness Score**
Waste Aware Shopping			
Unwanted Mail	e.g. no promotional activities and is low cost option (Table 8.10) so key action point	+	+++
Home Composting	e.g. e.g. no promotional activities and could make major contribution, so key action point	+	++++
Community Composting			
Re-use / Refurbishment			
Product Services			
Retailer Involvement			

*Present Effectiveness Score could be 5-point scale:
+= Very limited   (less than 0.2%) to **+++++** = Comprehensive (3%)

**Future Effectiveness Score indicates possible cost effective waste reductions:
+= Very limited (less than 0.2%) to **+++++** = Comprehensive (3%)

Rank key priorities

Produce a priority (see Info Box 9.2) ranking for each activity using a numeric scoring system.
For each activity there are at least 10 questions that have to be asked, these are:

- waste impact;
- wider benefits;
- ease of implementation;
- fit with other projects;
- local circumstances;
- lifetime (short, medium or long);
- sustainability and self perpetuating;
- costs;
- overall benefits; and
- funding options.

For each activity a value of 1-5 can be given for each question:

- 1 is a low score that may mean a small waste impact and a high cost with low overall benefit; and
- 5 is a high score and could mean a high waste impact at low cost with high overall benefits.

For 10 questions, a score of 50 would mean an activity that was of the highest priority. Info Box 9.2 contains an example of a prioritisation checklist, taken from the NRWF Toolkit. This checklist should not be taken as a definitive guide and used only as an example (**see Additional resource 3).**

Info Box 9.2

Prioritisation checklist
Waste Impact: What can these options contribute in terms of impact on the waste stream? Think about local waste composition data where available.
Other Benefits: What other environmental costs / benefits (e.g. transport impacts) and social benefits (e.g. training and social inclusion) might there be?
Ease of implementation: How easy will it be in practical terms to take the project forward? Is it possible to build on an existing project or better / necessary to start afresh? What skills and human resources will be required?
Fit with other projects: How well will the new / improved project "fit" with existing local, regional and national projects, priorities and targets? Can duplication and overlap be avoided? Will there be synergies/ economies of scale?
Local Circumstance: Will local circumstances affect things? Think about such issues as population density, level of deprivation / wealth (e.g. ACORN classification), birth rates etc.
Longevity: How long lived are project impacts likely to be? Just for the life of the project or will there be amore permanent change (e.g. in public behaviour)?
Cap-Ex: How much capital expenditure will be required? Is any new equipment required? Are there any implications regarding the premises needed?
Net On-Cost: What are the key operating cost elements and revenue streams? What are these likely to be in rough terms? What will the net ongoing cost / surplus be?
Funding Options: Will there be some appropriate funding in terms of start up and on going?

You should now address the following action point, available in your Workbook.

Action Point 9.1
In addition to the options shown in Box 9.1 what other options should be considered? Prioritise these options under different categories.
Assess what would influence the prioritisation of certain targets e.g. cost, legalisation etc.

9.4   Step 4: Planning the Waste Minimisation/Prevention Programme

The establishment of priorities within the project will provide a basis for the next step of planning the actual Programme (**see Additional resource 15**).

Having established gaps and priorities, the formulation of specific objectives will allow direction and definition within the programme. It may be a simple case of establishing one aim and a few objectives, or the waste minimisation strategy that needs to be employed may require several distinctive aims each with their own set of objectives.

A great deal of thought is needed in order to develop realistic targets within the time frame of the programme. It may be easier to consider lower cost easier targets (e.g. building on existing activities) than developing entirely novel, complex projects, which would benefit from experience.
For each of the programme objectives, SMART (Simple, Measurable, Achievable, Relevant with clear Timescales) targets should be considered.

9.5   Step 5: Implementation of the Programme

A key question is: What type of project?

In industrial/commercial waste minimisation there are a number of club / project categories. (Table 9.3)

Table 9.3: Types of Industrial / Commercial Waste Minimisation Clubs.

Type	Typical Duration	Typical Finance	Typical Number of Companies
Demonstration: Significant external support	1 to 2 years	> £500,000	10-15
Facilitated Self-help: Uses in-company expertise	1 to 2 years	£100,000	10-20
Self-Help: Very little external support	1 year	£20,000	10-20
Green Business Club	Open ended	<£5,000	10-30

There is a need to develop categories for waste minimisation campaigns. A Demonstration Project for household waste minimisation would need to:

- run for at least 3 years;
- develop a rolling programme that has distinct phases from commencement to completion;
- integration of all major partners;
- tackle a wide range of waste streams;
- develop and implement a Succession Strategy so that waste minimisation is supported for the foreseeable future (at least 5 years); and
- have sufficient resource to fund all components. Recent data suggest that the spend per household is in excess of £2.50 for general waste reduction campaigns over 1 to 2 years. For a District Council with 100,000 homes this would lead to a cost of at least £250,000. A well integrated 3 year Demonstration Project with a range of targets will cost in excess of £500,000.

Once the type of project has been determined the following steps are required:

- Set aims / key objectives and associated targets. These must be SMART (Specific, Measurable, Achievable, Relevant and have clear Timescales);
- Establish target audience(s). There needs to be a clear target audience for each major activity e.g. supermarket shoppers;
- Accommodation. Do you need a central office? For re-use projects you will need space to store. Do you need a mobile unit for campaigns in town squares, retail parks?
- Equipment. What vehicles do you need? What equipment do you need? Laptops and projectors for PowerPoint? Weighing scales etc?

- Health and Safety issues. Staff and the public need to be protected. Have you taken professional advice? Have you carried out a risk assessment?
- Compliance Issues. Have you carried out an environmental assessment for those activities that require them. Have you taken advice from the Environment Agency?
- Environmental Policy. Do you have a policy in place and its attendant annual report?
- Communications Campaigns. The pro-environmental message needs to drive the agenda. There is a need for the right mix of staff with the required expertise. What methods / what mix: Doorstepping, Internet, Mobile phone messages, Displays, Leaflets, Press releases?
- Key Performance Indicators. There is a need for Key Performance Indictors (KPIs) / measures. Once baseline is established then progress can be assessed;
- Partners. A wide array of local, regional and national partners will enable a project to call upon internal expertise;
- Management. Role and responsibilities need to be agreed in advance. Steering Group needs to ensure that timescales are being met to budget. This will initially require a memoranda of understanding and finally a multi-lateral contract between all parties;
- Staffing. What staff are required and for what time period? You will need expert staff in e.g. waste management, engineering, marketing and communications, education / training, research;
- Cost and income streams. These will require expert financial management and they need to be planned using an approach such as (Table 9.4);

Table 9.4: Typical Cost and Income Streams

Cost – Capital and Operating	Income
Waste management fees	Waste Collection fees (contract with LA) Sale of goods Recycling credits Sponsorship
Vehicles, lease or purchase, fuel, tax, insurance, maintenance	Sale of vehicle Sponsorship Hire

- Funding. Identify all funding opportunities. Work closely with Business Link, Learning and Skills Council, European Social Fund, etc; and
- Timetable. There is a need for a clear timetable of all activities and milestones.

Firstly, produce tables of Objectives and Timescales for each waste minimisation activity e.g. Table 9.5.

Table 9.5: Waste Minimisation Activities, Objectives and Timescales

Waste Minimisation Activity	Objective(s)	Timescales
Waste Aware Shopping	To divert up to 400 tonnes from 40,000 households	Awareness in 60% of consumers in year 1 and 80% in year 2.
Reuse in home	To divert up to 1,000 tonnes from 40,000 households	Awareness in 30% homes in year 1 and 60% in year 2.

Then produce a waste minimisation programme timetable. Table 9.6 represents a 2 year programme which has been divided into quarters (3 month period).

Table 9.6: Waste Minimisation Programme Timetable for Eight Quarters (Q) over a two year period.

Task	Responsibility	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Management									
Initial review									
Gap analysis									
Develop partnership									
Baseline data									
Recruit staff									
Purchase apparatus									
Acquire premises									
Run pilot									
Activities e.g. Waste Aware Shopping									
Reports									

Finally, produce a waste minimisation Action Plan. All of the above must be included into a waste minimisation action plan that is widely disseminated to all stakeholders.

9.6 Step 6: Review Progress

On going monitoring requires a number of actions; these include:

- Gathering chosen KPI data to compare with baseline and assess progress towards targets;
- Compare progress against other waste minimisation programmes. Has the programme used recently developed best practice?
- Elucidate success factors and barriers;
- Consider whether changes required in Steering Group, or Staff;
- Analyse data and disseminate widely to all stakeholders; and
- Produce final evaluation report for funders, Opinion Makers.

Action Point 9.2

Outline a plan for the development of a waste minimisation programme for your LA/company.

10. Waste Minimisation Research Requirements

10.1 DEFRA Waste and Resources R&D Strategy 2004-2007

(http://www.defra.gov.uk/environment/waste/wip/research/pdf/rdstrategy.pdf)

In response to recommendations in the Strategy Unit (2002) report "Waste not Want not", DEFRA established a Waste Research Team to distribute funds for waste management research in alignment with Government strategic priorities. The Waste and Resources R&D Strategy was developed to contribute to breaking the link between economic growth and, amongst other things, waste arisings. The 3-year Strategy will have an annual £5M budget.

The Strategy consists of 8 themes, two of which impact directly on household waste minimisation. The themes inform the wider research community of the research areas that require urgent attention, if England is to increasingly adopt sustainable waste management practice.

It may be argued that the themes also inform us on what research should have taken place, so that present strategic decisions are based upon sound scientific evidence.

10.1.1 Theme 1: Sustainable Resource Consumption and Management

This has two sections that are related to household waste minimisation (Table 10.1).

"*Section 1.3.i*": focuses upon household waste minimisation and outlines the areas that require further research e.g. demand and supply side measures.

"*Section 1.4*": focuses upon waste composition and trends e.g. understanding the nature of MSW increases.

Table 10.1: DEFRA Research Strategy for Sustainable Resource Consumption and Management (Theme 1)

1.3 Exploring techniques and methodologies for effective household waste minimisation:
■ 'Demand side' measures (involving the consumer and community at large) ■ 'Supply side' measures (focussing on retailer and manufacturer involvement) ■ Policy and legislative measures (support studies) General issues: ■ IT developments for benchmarking purposes ■ minimisation of material difficult to manage ■ evaluation of interactions between industrial/commercial waste and household waste ■ build upon and further develop research by OECD on strategic waste minimisation
1.4 Understanding waste composition and trends
■ Understanding and evaluation of the nature of MSW increases ■ Establishing real growth versus displacement across waste streams ■ Establishing a baseline and predicting change of the residual composition of MSW over a 10-15 year period ■ Accounting for external trends in waste growth, such as packaging

10.1.2 Theme 5: Social Dimension

This has two sections that are related to pro-environmental behaviour and waste minimisation.

Section 5.1. This focuses upon understanding pro-environmental behaviour and how to enhance it, e.g. Research into influencing environmental behaviour, for example through communication and infrastructure development and / or 'environmental citizenship' approach (Table 9.2).

Section 5.3. This focuses upon development of tools to facilitate behaviour change. Research into the use of psychological models to determine drivers for encouraging waste minimisation as compared to recycling (Table 10.2).

Table 10.2: DEFRA Research Strategy for Social Dimension (Theme 5)

10.2. Understanding pro-environmental behaviour and how to enhance it

- Identification and collation of new and recently completed research undertaken in this area
- Meta-analysis of existing research into behaviour and campaign development
- Research into influencing environmental behaviour, for example through communication and infrastructure development and / or 'environmental citizenship' approach
- Research into better understanding of anti- or non-environmental behaviour (including the interface with liveability)
- Development of a conceptual framework for understanding and analysing householder attitudes towards MSW management and evaluating how these relate to other forms of environmental behaviour and environmental decision making
- Attitudes, barriers and success factors in the development of producer campaigns
- Holistic waste minimisation campaigns: developing partnership approaches to use the successful results from industrial / commercial waste minimisation to enhance MSW minimisation campaigns
- Sociological study of how to influence product designers, and identify barriers to retailers
- Understanding household drivers and behaviour in order to optimise collection systems and home composting
- Research to investigate which lifestyle decisions that bear on wastes management are actually influential compared to what people think is important (i.e. uncovering the relative impacts of human behaviour)
- Identifying the links between kerbside collection and recycling, and fly-tipping

5.3. Development of tools and instruments to facilitate behaviour change

- Measuring the effectiveness of communication, marketing and PR campaigns
- An analysis of the suitability of multi-attribute, socio-psychological or other models to predict and explain consumer behaviour
- Research into the use of psychological models to determine drivers for encouraging waste minimisation as compared to recycling

Defra research reports form the WRAG programme can be accessed via:

www.defra.gov.uk/environment/waste/wip/research/wrep-projects

also:

www.wastenet.org

10.2 The Waste and Resources Evidence Strategy 2007-2011

The Waste and Resources Evidence Strategy 2007-2011, follows the Waste and
Resources R&D
Strategy 2004/05-2006/07, which was produced after the establishment of a dedicated
Waste and
Resources Research Programme within Defra in 2003. This programme is highly
regarded, generating over 80 projects to date and underpinned by a budget of up to £5
million per annum so far. In future it will still continue with a budget of £12.3 m for 2007-
2011.

The Waste and Resources Evidence Strategy provides the official rationale and objectives statement (ROAME) for the evidence and research programme and will underpin and provide a framework for commissioning policy relevant and forward looking waste and resources research for the period up to 2011. The research programme, now called the Waste and Resources Evidence Programme, will continue to fulfil short, medium and long-term evidence and research needs, while maintaining a robust evidence base for policymaking. The new programme has 6 main themes (Table xxx). It will have a spend of £12.3 m over 2007-2011. The programme is supported by the Waste Evidence Branch that was the Waste Research Team. The evidence base is comprised of primary and secondary research from the social and physical sciences, economic analysis and modelling, statistical data and interpretation, and stakeholder and expert opinions; while innovation plays a key role in allowing us to exploit new ideas.

The change in this strategy's name, from an R&D Strategy to an Evidence Strategy, emphasises the programme's renewed focus on the wider evidence base.

Table 10.3 Key questions for general waste prevention in the themes

Theme A: Economics and Incentives. Anticipated spend: £2.2m
Household Incentives for Recycling ■ Can we attribute the speed of diversion from landfill to specific measures or is this related to other issues such as the speed with which the industry can adjust to the increasing cost of landfill, the provision of alternatives, the kind of technologies developed or imported and costs, distribution around the UK or the capacity of export markets? ■ What are likely impacts of household incentives on different groups in society? Is waste behaviour related to income, age and other social factors? What are the most effective financial incentives in the UK context? ■ How would we set up an evaluation framework for household incentive schemes that encourage waste prevention? What would be the baseline for comparison and how would we attribute any changes to household incentives as opposed to other measures? What are the potential adverse impacts of incentives on waste prevention behaviour and how would we monitor them?
Theme B: Effective Regulation: Anticipated spend: £2.9m
■ What evidence is needed to underpin decisions on the future regulation of household hazardous wastes, e.g. what are the costs, benefits and scope for voluntary agreements on these wastes with relevant sectors?
Theme C: Increasing Resource Efficiency Anticipated spend: £1.3m
Key Materials ■ What work is required to develop the most effective measures to enhance waste prevention, recycling and recovery of the key materials identified in the Waste Strategy for England 2007 (textiles, aluminium, plastics, paper/card, food and garden waste, wood and glass)?
Producer Responsibility ■ Does producer responsibility give the right incentives for product design/waste prevention, re-use and recycling? Has the scope for extending producer responsibility obligations to cover waste management and material recovery been fully explored?
Packaging ■ What are the environmental impacts of biodegradable and degradable packaging, including the contamination of recycling streams? ■ What further evidence is required to support amendment of Producer Responsibility Regulations to achieve packaging minimisation?
Theme D. Stimulating Investment in Waste Collection and Treatment Anticipated Spend: £1.7m

Markets for Recycled Materials
- What is the effectiveness of current policies in providing collection services which optimise resource recovery, e.g. can the conflicting objectives of waste diversion and recycling targets be reconciled with the demand-driven quality, quantity, consistency, reliability, price-constrained objectives of the manufacturing industry?

Theme E. Promoting Shared Responsibilities Anticipated spend: £1.7m

Local Authorities, Regional Government and Industry Interactions
- What other performance targets and indicators would enhance the new Local Government Performance Framework, e.g. greenhouse gas emissions?

The Third Sector
- Is there a need to raise awareness of the third sector among potential customers and to address barriers to its greater involvement in delivering waste services? Are further measures needed to facilitate access to local authority waste work by third sector organisations? What more do we need to do to promote change/uptake/engagement in the third sector?

Wider Behaviour Change
- What does current research on household waste prevention tell us and where are the evidence gaps in this work? What do we know about the drivers for personal acquisition, consumption and disposal behaviours and how do we improve our forecasting of the impacts of technology and lifestyle trends on waste arisings and composition?
- Is there a sense of how much householders can do to prevent waste, and how much influence they have on retailers and manufacturers? How do we ensure an integrated policy and delivery approach to enhancing community-based behavioural change?
- To what extent will householders change their behaviour as a result of changes to landfill prices?
- Is there a need to know more about the barriers to waste prevention, reduction and recovery? Can any of these barriers be influenced? What are the best incentives for the re-use of materials?

Theme F. Assembling, Modelling and Interpreting Evidence Anticipated spend: £2.5m

Carbon Indicators
- What research is needed to undertake a programme to develop the national carbon indicator for waste prevention and management? What data are lacking and how do we go about obtaining it?
- How do we develop carbon indicators that account for waste prevention?

Data Issues
- How fast is waste growing? What factors have caused recent observations of a slowing in waste growth rates? How do we continue to support this trend?
- How do we obtain data on C&I waste (including SIC code) without doing another large survey?
- Do we have baselines against which to measure progress of the Waste Strategy's implementation and are the correct data systems in place to enable us to monitor the indicators set out in the strategy?

10.3 Dissemination on waste prevention etc.

Defra is already moving forward with several communications tools and mechanisms, and plans to add additional ones in order to communicate our evidence base and exchange information with other evidence providers, industry practitioners and the public. These include:

Wastenet: a web-based information portal for waste and resources related research drawn from Defra and a variety of other evidence providers, including the EA, WRAP and

academia, was launched at CIWM Torbay 2007. Wastenet can be used by academics and researchers, as well as industry practitioners to access data and information relevant to their sectors.

- Programme internet pages29: provide basic information about the programme and the projects in its portfolio.
- Briefing notes: informative overviews of the projects in our portfolio.
- Research conferences: for both internal and external audiences which allow for reflection and discussion of the research programme, existing state of the evidence base and scope for change.
- Where possible the programme will seek out collaborative events at other conferences (e.g. since 2005, the programme has been hosting events at CIWM's annual conferences).
- The programme will continue to sponsor the biannual Waste Conference, the next one to be held in Autumn 2008.
- Theme specific knowledge events: have and will continue to bring together policy makers, researchers and other stakeholders across broad areas, such as waste prevention and behaviour change or the integrated approach to WEEE recycling, which was organised through the DBERR-funded Knowledge Transfer Network on Resource Efficiency. Sector specific events have also included the national conference Beyond Recycling 2006.
- Research publications and technical papers: encouraging contractors to disseminate programme findings at key conferences and in selected peer-reviewed journals.
- Heightened use of the media: pro-actively feed research findings to Defra's press office.

11. Key References

Barr, S., Gilg, A.W. and Ford, N.J. (2001) Pro-Environmental Behaviour: Determining the drivers for waste minimisation compared to reused and recycling in Exeter. *Environment and Planning A*, **33 (11)** pp1899-2088.

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Defra (2004B) Waste and Resources R&D Strategy [online; accessed 18/05/05]
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Defra, (2004C) e-Digest Statistics about: Waste and Recycling (Municipal and household waste) [online; accessed 16/05/05]
http://www.defra.gov.uk/environment/statistics/waste/wrmunicipal.htm#wrtb3

Defra (2004D) Waste and Resources R&D Strategy 2004/05-2006/07.[accessed 20/01/06] http://www.defra.gov.uk/environment/waste/wip/research/pdf/rdstrategy.pdf

Defra (2005 A) Waste Implementation Programme. Waste Minimisation. [online; accessed 23/05/05] http://www.defra.gov.uk/environment/waste/wip/wastemin/

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National Statistics (2004) Living In Britain 2002. [online; accessed 26/01/05]
http://www.statistics.gov.uk/lib2002/default.asp)

OECD (2000) Strategic Waste Prevention. OECD Reference Manual

Parfitt, J (2002) Analysis of Household Waste Analysis of Household Waste Composition and Factors Driving waste increases. WRAP. [online: accessed 23/05/05]
http://www.number-10.gov.uk/su/waste/report/downloads/composition.pdf

Rethink Rubbish (2004) Key Performance Indicators. A report prepared for WRAP [online; accessed 23/05/05] http://www.recyclenowpartners.org.uk/research-links.htm

Tonglet, M., Phillips, P.S. and Bates, M.P. (2004) Determining Drivers for household pro-environmental behaviour: waste minimisation compared to recycling. *Conservation and Recycling,* **42**. pp 27-48

12. Useful Internet Sites on Waste Minimisation/ Prevention

Household Waste Prevention

Recycle Now – What more can I do?
http://www.recyclenow.com/what_more_can_i_do/index.html
Wealden Home Composting
http://www.wealden.gov.uk/environment_and_transport/Recycling/Home_Composting/index.aspx
Consultation on Preventing Household Waste in Scotland
http://www.scotland.gov.uk/Publications/2006/02/02131916/0
http://www.scotland.gov.uk/Publications/2007/02/23113217/0
SEPA Waste Prevention Guide
http://www.sepa.org.uk/nws/prevention/index.htm
NRWF Household Waste Prevention Toolkit
http://www.wrap.org.uk/local_authorities/toolkits_good_practice/nrwf_household_waste_prevention_toolkit/
DEFRA Science and Research Projects
http://www2.defra.gov.uk/research/project_data/projects.asp?M=KWS&V=Effective%20household%20waste%20prevention

Domestic Waste Minimisation

Northampton's Issues for Domestic Waste Minimisation
http://oldweb.northampton.ac.uk/aps/env/waste_min_guide/shankscontent.html
Independent – advice from this newspaper
http://environment.independent.co.uk/lifestyle/article2624118.ece
Northamptonshire Designing for Waste Management
http://www.northamptonshire.gov.uk/NR/rdonlyres/92F19ED8-7E48-45AC-A1EC-FBB2F6CF9CD3/0/010606GSPDDesignWstMngtHG.pdf

UK web sites- National

Recycle Now
http://www.recyclenowpartners.org.uk/using_recycle_now/planning/index.html
Good site for providing clear, practical information and working tools to help you deliver a focused and sustained recycling campaign. Although this site is focused on recycling the principles and information can be utilised in waste minimisation strategies.

UK Government Sustainable Development
http://www.sustainable-development.gov.uk/index.htm
UK Parliament web site (has a number of reports available in pdf format)
http://www.parliament.uk/

Friends of the Earth web site lists a number of wastes related links:
http://www.foe.co.uk/campaigns/waste/links.html

Defra, *Survey of Public Attitudes to Quality of Life and to the Environment: 2001*
http://www.defra.gov.uk/environment/statistics/pubatt/download/pdf/survey2001.pdf

Defra, Sustainable Development
http://www.defra.gov.uk/news/issues/recycle.asp
Cabinet Office web site Waste section
http://www.cabinetoffice.gov.uk/strategy/work_areas/waste/

ETDEWEB has some ETSU reports available in full text: although users will need to register, it is free.
http://www.etde.org/etdeweb/

Environment council's *Projects* offer information on waste strategies, including household waste minimisation
http://www.the-environment-council.org.uk/projects.html
Environment Agency's household waste minimisation section is a good source of information for members of the public and is available at:
http://www.environment-agency.gov.uk/subjects/waste/1030612/?lang=_e
Environment Agency's *Household waste survey*
http://www.environment-agency.gov.uk/yourenv/432430/432434/432453/435561/435649/
Environment Agency also has some stats on municipal waste at:
http://www.environment-agency.gov.uk/regions/anglian/830408/842762/842923/845510/845521/

edie has a number of news articles relevant to household waste minimisation:
http://www.edie.net/index2.html

ESA Web site is a good source of information. Their links section is good:
http://www.esauk.org/links/
ESA Ernst & Young report on householders paying for the disposal of their waste:
http://www.esauk.org/publications/reports/ernstandyoung.pdf
ESA Press releases sometimes cover household waste:
http://www.esauk.org/press/
ESA Annual statement:
http://www.esauk.org/publications/reports/ESA_Annual_Statement.pdf
ESA Managing waste section has some useful diagrams:
http://www.esauk.org/waste/

Improvement and Development Agency - Domestic Waste Collection legislation and good practice
http://www.idea.gov.uk/idk/core/page.do?pageId=78473

Scottish Environment Protection Agency News releases refer to household waste:
http://www.sepa.org.uk/news/releases/index.asp
SEPA National Waste Plan and Area Waste Plans available at:
http://www.sepa.org.uk/nws/index.htm
SEPA's waste minimisation programme:
http://www.sepa.org.uk/wastemin/programme/
Scottish Waste Awareness Group
http://www.wascot.org.uk/main.htm

Waste Online information sheets offer advice on reduce, reuse and recycle, themed according to material type
http://www.wasteonline.org.uk/searchresults.aspx?info=a

WasteWatch educate individuals and organisations to recycle
http://www.wastewatch.org.uk/Homepage
NSCA Report: *Relative impacts of transport emissions in recycling*
http://www.pba.co.uk/Portals/0/news/publications/NSCA%20report.pdf

Residua Resource Recovery Forum refers to studies on kerbside collection schemes and public waste behaviour
http://www.residua.com/rrf/new/RRFnew/rrfnews010102.htm

WRAP reports at:
http://www.wrap.org.uk/reports.asp

UK Websites- Local

Waste Reduction and Recycling in South Gloucestershire
http://www.southglos.gov.uk/Environment/RubbishWasteandRecycling/
Waste in Northamptonshire
http://www.northampton.gov.uk/site/scripts/documents.php?categoryID=420
Brighton and Hove (produces leaflets for locals on how to reduce their waste)
http://www.brighton-hove.gov.uk/index.cfm?request=c1121223
Wealden District Council
http://www.wealden.gov.uk/Environment_and_Transport/Recycling/index.aspx
Hampshire's Project Integra
http://www.integra.org.uk/index.html
Leicestershire County Council
http://www.leics.gov.uk/index/environment/waste.htm
Recycling (North Norfolk district Council)
http://www.north-norfolk.gov.uk/refuse/default_111.asp
Cambridge City Council *Waste Strategy Policy*
http://www.cambridge.gov.uk/ccm/content/ehws/waste-strategy/waste-strategy-policy.en
Cambridge *Reduce, Reuse and Recycle*
http://www.cambridge.gov.uk/ccm/content/ehws/waste-strategy/reduce-reuse-recycle.en
North Lanarkshire's *Waste Management Outline Strategy*
http://www.northlan.gov.uk/your+council/policies+strategies+and+plans/environment/wms+foreword.html
Neath Port Talbot *Waste Management*
http://ims.npt.gov.uk/imsapps/waste/waste_neednotbe.aspx

UK Websites- academic
University of Exeter Environmental Behaviour Research Group
http://www.ex.ac.uk/ebrg/
Sunrise projects at the University of Southampton
http://www.soton.ac.uk/~sunrise/projectsEB.htm
Wales Waste and Resources Research Centre at Cardiff University
http://www.wwrrec.cf.ac.uk/index.asp
Integrated Waste Systems Research Area from the Open University
http://technology.open.ac.uk/iws/research.htm

European Websites
European Environment agency web site (has many reports)
http://reports.eea.eu.int/
Waste Centre Denmark report on household waste
http://www.wasteinfo.dk/waste+and+collection+companies/sources+types+and+fractions/waste+from+households
Report on Finnish town waste minimisation project
http://www.fujitaresearch.com/reports/waste.html
French Agency for Environment and Energy management
http://www.ademe.fr/default.htm

US Websites

New York Waste Reduction and Recycling Program
http://www.dec.state.ny.us/website/dshm/redrecy/

California Integrated Wastes Management Board
http://www.ciwmb.ca.gov/Publications/default.asp?cat=7
Purdue University Household waste site
http://www.purdue.edu/dp/envirosoft/housewaste/src/title.htm
US EPA Municipal Solid Waste
http://www.epa.gov/epaoswer/non-hw/muncpl/
Air and Waste Management Association
http://www.awma.org/

Internet Consumer Recycling Guide
http://www.obviously.com/recycle/

Other

International Solid Waste Association
http://www.iswa.org/
University of Waterloo
http://wastemanagement.uwaterloo.ca/
Enviro-Access
http://www.enviroaccess.ca/eng/index.html#P1
Charging for Domestic Waste
http://www.psi.org.uk/publications/publication.asp?publication_id=541

Gateway sites

Intute Science, Engineering and Technology (RDN Geography and Environment gateway)
http://www.intute.ac.uk/sciences/
NB Not much use on searches for waste minimisation and household waste
Europa - Environment
http://europa.eu.int/comm/environment/index_en.htm
UKOnline gov.uk
http://www.open.gov.uk/Home/HOHome/1,1031,~801b22~fs~en,00.html

13. List of Additional Resources

These are to be found on WRAP site. Summative means they will be of particular help in the Assignment.

Additional resource	Title	Summative (S) or Formative (F)	Web link
1	Public engagement in waste challenge	F	http://www.nrwf.org.uk/documents/BestPracticeGuidelines.pdf
2	DEFRA Behaviour change: Tacking the waste challenge	F	http://www.defra.gov.uk/science/Project_Data/DocumentLibrary/SD14002/SD14002_3800_INF.pdf
3	NRWF toolkit (on WRAP site)	S	http://www.wrap.org.uk/local_authorities/toolkits_good_practice/nrwf_household_waste_prevention_toolkit/index.html
4	DEFRA: International comparison of waste minimisation	F	http://www.defra.gov.uk/environment/waste/wip/wastemin/enviros-wasteprevent.pdf
5	DEFRA: waste composition - Calderdale	F	See Additional resources on VLE for full document
6	Understanding food waste research summary - WRAP	F	http://www.wrap.org.uk/downloads/FoodWasteResearchSummaryFINALADP29_3__07.0c955fba.pdf
7	The food waste roundtable presentation - WRAP	F	See Additional resources on VLE for full document
8	The OU Household Waste Survey	F	http://www.defra.gov.uk/environment/statistics/waste/research/download/ou-fct05-20060220.pdf
9	Promoting pro-environmental behaviour: Existing Evidence	F	http://www.defra.gov.uk/science/project_data/DocumentLibrary/SD14002/SD14002_3739_FRP.pdf
10	DEFRA Guidance on MSWM Strategies	F	http://www.defra.gov.uk/environment/waste/localauth/pdf/guidemunwaste-strategy.pdf
11	Dorset waste reduction strategy	S	See Additional resources on VLE for full document
12	Tonglet paper on waste minimisation and	F	See Additional resources on VLE for full document

	behaviour		
13	Scottish Household Waste Prevention Guide	S	http://www.sepa.org.uk/pdf/nws/prevention/wpguide/Waste_Prevention_Guide.pdf
14	Barnet Waste Prevention Strategy	S	http://www.barnet.gov.uk/waste-prevention-strategy2005-2020.pdf
15	Scottish Household Waste Prevention Plan	S	http://www.scotland.gov.uk/Resource/Doc/166848/0045564.pdf
16	KPIs	F	www.rethinkrubbishpartners.com/.../download.php?filename=kpi%20**report**%20final%20v2%20complete%20pdf%202.pdf
17	OECD: Measuring waste prevention	F	
18	OECD: Waste prevention	F	
19	Eco-footprint for Northamptonshire	F	

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