ERTDI Programme 2000 – 2006, Phase 2

Assessment and Development of a Waste Prevention Framework for Ireland

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FINAL REPORT

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ABBREVIATIONS AND GLOSSARY OF TERMS

BATNEEC	Best Available Technology Not Entailing Excessive Costs
C&D	Construction and Demolition
CPT	Core Prevention Team (CPT) – body within EPA recommended by *Delivering Change* to implement National Waste Prevention Programme
Dematerialisation	Dematerialisation is the reduction of the input, use and output of materials in human societies. It can occur at different levels such as nations, regions and cities but also within different sectors of industry, households and in individual products – see MIPS.
DoELG	Department of Environment and Local Government
Elimination	Elimination is defined herein as "the complete prevention of waste generated by reducing material or energy intensity and/or by virtual elimination of dangerous substances in a product's complete life cycle".
ELV	End-of-life vehicle
ENGO	Environmental Non-Governmental Organisation
EPA	Environmental Protection Agency
EPR	Extended Product Responsibility. Extended producer responsibility means that the responsibility of producers for their products is extended to all stages of the full life-cycle of the product or packaging.
ERTDI	Environmental Research, Technological Development and Innovation
Factor 4	Ernst von Weizscker at the Wuppertal Institute introduced this concept at the beginning of the 1990s. Its hypothesis is that over a span of one generation (25 years), it was felt possible to both to double average living standards within the European Union, while at the same time reducing the resources required to secure these standards by 50%.
Factor 10	On average, it is necessary to reduce human environmental impact by 50%. If, at the same time, the Western standard of living, enjoyed by about one-fifth of the world's population, is to be extended to the entire population of the earth, the underlying technology needs to become about 10 times more efficient.
GDP	Gross Domestic Product. The total market value of all final goods and services produced in a country in a given year, equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports.

IBEC	Irish Business and Employers Confederation. Umbrella body for Ireland's main industrial sectoral groups and associations.
IPC	Integrated Pollution Control. Licensing system for industry introduced in Ireland in 1994, and implemented by the EPA based upon the Integrated Pollution Prevention Control Directive, 1996.
IPP	Integrated Product Policy. IPP attempts to stimulate each part of a product's life cycle to improve its environmental performance. IPP includes measures such as economic instruments, substance bans, voluntary agreements, environmental labelling and product design guidelines.
LCA	Life Cycle Assessment. LCA is a method of assessing the environmental impact of a product or process during all stages of its life cycle, from raw material extraction to disposal.
MIPS	Material Intensity Per Service: the materials and energy required in order to provide a single service of a product (e.g. the MIPS of a shopping bag used just once and discarded, will be three times that of a shopping bag used three times). A reduction in MIPS is sometimes known as dematerialisation.
MSW	Municipal Solid Waste. Municipal solid waste means solid household waste as well as commercial and other waste, which because of its nature and composition, is similar to household waste.
NCDWC	National Construction and Demolition Waste Council. Body set up to implement 66 recommendations by Task Force of C&D industry in order to meet Irish national C&D waste recovery figures of 85% recovery by 2013.
NCCS	The (Irish) National Climate Change Strategy
NGO	Non-governmental organisation (see also ENGO)
PMD	Waste plastic, metal containers, and drinking cartons – a separate waste fraction used in some regions such as Flanders
Prevention	Waste prevention is defined herein as: "Elimination or reduction at source of material and energy consumption, waste arisings (solid, gaseous, heat and liquid) and harmful substances".
Recycling	Recycling means the reprocessing in a production process of waste materials for the original purpose or for other purposes - in this report it excludes organic recycling (or composting) and it excludes energy recovery; it is usually synonymous with mechanical recycling.
Reduction	Reduction is defined herein as "reducing (but not completely preventing) material or energy consumption and/or the use

	of dangerous substances".
Reuse	Reuse is defined herein as "the multiple use of a product or material in its original form, for its original or for an alternative purpose, with our without reconditioning".
REPAK	REPAK was established in 1996 as Irish Industry's response to the obligations placed on Ireland by the *EU Directive on Packaging and Packaging Waste (94/62/EC*) and is currently the only Approved Body under the *Waste Management (Packaging) Regulations 1997*.
VFG	Vegetable, fruit and garden waste - a separate waste fraction used in some regions such as Flanders
Waste Arisings	Actual amounts of waste arising
Waste Available	Amounts of waste made available for collection and recovery
WEEE	Waste electrical and electronic equipment

EXECUTIVE SUMMARY

Ireland currently faces a major challenge regarding its use of materials and energy and its management of waste. The problems relating to solid waste in particular are well documented and have been quantified in several studies. The increase in waste arisings in Ireland during the decade 1990 – 2000, no doubt influenced by the economic growth during that period, is of particular concern.

A radical, urgent and comprehensive response to the problem of waste and materials is therefore required, at all levels in society, and utilising a wide spread of instruments and initiatives. This response must be focused on prevention – to decouple waste creation from economic growth and reverse current trends. One such approach involves the development and implementation of a waste prevention strategy and such a strategy is strongly recommended in this study.

An inadequate approach to waste management, inefficient use of materials, a dependency on landfill, a resistance to change and an unacceptable level of illegal dumping are some of the inevitable manifestations of the challenging situation consequent from the growing level of waste creation that pertains to this country.

Annual increases in waste arisings (almost 10% per annum from 1995 to 2000) confirm that Ireland has not yet succeeded in decoupling waste generation from economic growth (as measured by Gross Domestic Product (GDP)). This is in contrast to the relative stabilisation of waste arisings in some other regions where practical measures have been implemented that have been designed to arrest and reverse the growth in waste production.

In order to meet this and other challenges, in recent years Ireland has adopted a number of important policies in relation to resource use, waste management, sustainability and the abatement of greenhouse gas emissions. Specific policy documents include:

- A National Policy Statement on Waste Management "*Changing Our Ways*", issued in September 1998.
- A Supplementary Policy Statement "*Delivering Change*" dedicated to the higher priority waste management practices of Prevention, Re-Use and Recycling, issued in March 2002.
- A National Hazardous Waste Management Plan designed to prevent and manage hazardous waste, adopted in July 2001.
- A National Sustainable Development Strategy "*Sustainable Development: A Strategy for Ireland*", issued in 1997 and supplemented by "*Making Ireland's Development Sustainable:* Review, Assessment and Future Action" issued in August 2002.
- A *National Climate Change Strategy*, issued in October 2000 and Supplemented by a *Progress Report* on *the Implementation of the National Climate Change Strategy* issued in May 2002.

Other important steps have also been taken to stem the growth of waste. The legislative framework has been strengthened by the Environmental Protection Agency Act (1992), Waste Management Acts (1996 and 2001), Protection of the Environment Act (2003) as well as several Regulations. Economic instruments have been applied, including the landfill levy, plastic bags levy and the setting up of the Environment Fund. Awareness levels are rising through the *It's Easy to Make a Difference* campaign, ENFO and locally by Environmental Education Officers, the Green Flag Programme etc.

However, despite the effective efforts of the many people involved in these developments, it is clear that a much more extensive and integrated approach is still required if Ireland is to attain the level of success that is apparent in some other countries.

With regard to prevention, an implementation of the recommendations of the *Delivering Change* policy document of March 2002 would be especially worthwhile, including the setting up of a Core Prevention Team within the Environmental Protection Agency (EPA) to develop a national strategy.

Much of Ireland's current approach to the development of a modern waste management system is based upon the initiatives contained in the 11 local and regional waste management plans that have now been adopted. However, while these plans acknowledge that prevention of waste is the priority, there is a lack of detail relating to specific measures that will be taken to ensure that progress is attained in stabilizing and reversing the trend of waste growth. This is not the case in terms of future waste disposal and recycling arrangements, which are described in detail in the plans and are, in many cases, substantial, ambitious and quite specific. It seems clear that the science of waste prevention is still developing in Ireland, especially at local level, and it is also important to point out that some major elements of any prevention programme, such as regulation and producer responsibility agreements, require implementation at a national level.

It is vital, however, that companies and local authorities do make firm arrangements to ensure that waste prevention will be achieved in practice. Many local authorities have by this stage appointed Environmental Education Officers who, it is expected, will oversee the development of some practical experience and knowledge of the techniques of waste prevention over time. The Department of the Environment and Local Government (DoELG) have published "*Delivering Change*", a supplementary Policy Statement dedicated exclusively to Prevention, Re-use and Recycling of waste. It is also hoped that the publication of this present study (*Assessment and Development of a Waste Prevention Framework for Ireland*) will add considerably to the body of knowledge available within Ireland on waste prevention. The establishment of the Core Prevention Team in the Environmental Protection Agency and the initiation of the National Prevention Programme should also ensure that a large impetus is provided for the practice of waste prevention. Given the above and other future initiatives, local authorities should be much better placed when the time comes to review their Waste Management Plans and to incorporate appropriate prevention initiatives within local/regional level action.

The quality of waste data and the underestimation of waste trends in some current Waste Management Plans is also a cause for concern. While it is accepted that the information provided was the best available at that time, there is a need to make every reasonable effort to ensure that the data can be more reliable in the future. Companies and local authorities must realise the importance of accurate data returns in making provision for future waste planning and to take every effort to ensure that the information provided is the very best available. In addition, the growth rates chosen for waste generation projections ought reasonably to reflect the level of effort that is actually going to be made in the attempt to stabilize and reverse the previous trends of a significant increase. The increased use of weighbridges and the establishment of the licensing/permitting regime should improve the situation and it is anticipated that the *2001 National Waste Database* will provide the most reliable waste statistics ever compiled in Ireland. Further and more detailed quantification studies are also required at local and national levels.

Delivering Change announced that, where appropriate and on the basis of advice from the Core Prevention Team, it is the intention to introduce mandatory waste audits and waste reduction programmes for those companies that fall below the thresholds for IPC licensing. It also advised of the intention to develop a Public Service Waste Management Programme, with particular emphasis on optimal prevention practices. These initiatives should have a great impact on waste prevention in both the private and the public sectors, especially if they focus on green procurement policies and practices, and are highly desirable.

Apart from any regulatory requirements, some sectors of industry and commerce, such as hotels and construction are already beginning to develop voluntary codes of best practice in waste management. Other sectors are encouraged to adopt similar guidelines for member companies, with a special emphasis on waste prevention and efficient resource utilisation.

Several barriers to waste prevention are identified in this report and these constitute a major obstacle to change, but Ireland's poor performance is due in no small measure to a lack of prioritisation of waste in Irish society and the lack of specific dedicated resources being allocated to prevention. Furthermore, the administrative structure to manage waste prevention, while greatly improved in recent years, remains underdeveloped and a dedicated body or team is required to deliver substantial progress. In companies and local authorities, there is a particular need to provide adequate resources and training in order to allow an effective programme of waste prevention measures to be developed and implemented. There is also a need to ensure that waste prevention initiatives are given a real priority over disposal and recycling activities when developing the resource management systems for implementation.

A series of instruments and tools have been applied in some other countries to ensure successful resource management and a decoupling of economic growth and waste. Four regions were analysed in detail during this study. The Netherlands, Denmark, Austria and Flanders have developed waste prevention frameworks based upon a solid foundation of information/communication, economic and regulatory initiatives. 10 such instruments are identified and described herein which also have the potential to be applied and developed in Ireland.

In order to initiate a waste preventive framework for Ireland, it is first necessary to define prevention. The recommended definition (which builds upon that used in the *Delivering Change* document) for waste prevention is:

> *Elimination or reduction at source of material and energy consumption, waste arisings (solid, gaseous, heat and liquid) and harmful substances.*

It is important that this definition is officially recognised and promoted, so that all those involved in waste matters are aware of what prevention entails (which is not currently the case). However it should also be noted that when focusing on prevention, waste is not the only concern and the consumption of raw materials and energy are of critical importance. Solid waste should also not be considered in isolation: the liquid and gaseous phases as well as waste heat etc. also require attention.

Any waste prevention framework will also necessitate certain essential elements. As a first step, commitment and leadership are required in all sectors of society to achieve success in relation to waste. Adequate resources must be allocated to any waste strategy as a demonstration of such commitment. As regards the level of funding required for the development a national waste prevention strategy, in the *National Hazardous Waste Management Plan* it was recommended that the prevention element be allocated £43.5 million (€55.2). It is suggested that at least the same level of resources for the prevention of non-hazardous waste would be required.

Other framework elements include**:** high quality data relating to waste and resources, the ability to measure prevention, the setting of realistic and effective targets, a solid foundation of instruments, a material management focus, the consideration of energy and equity issues, taking a full product life cycle approach, linking and synergising with other national strategies and a consideration of qualitative as well as quantitative prevention.

As stated above, there are 10 main sets of tools and instruments required to develop a waste prevention strategy. These include

- awareness raising
- technical support and training
- research
- green public procurement
- environmental taxes and charges
- producer responsibility
- economic supports and grants
- restrictions and bans
- agreements and covenants
- industrial permits and licenses.

However, a framework foundation, and a series of tools and instruments are not sufficient to bring about real change. What is needed most of all is action. Nine stakeholder groups are identified in this study that all have a role to play in any strategy and a responsibility to improve Ireland's management of resources and waste. These include: The Core Prevention Team (within the EPA), all other elements within The Environmental Protection Agency, Local Authorities, Government Departments and State Agencies, Environmental Non-Governmental Organisations, Environmental Experts, Compliance Schemes, The General Public and Industry/Commerce.

In all, 75 specific actions by these stakeholder groups are recommended, if any national waste strategy is to succeed. They are listed in the main body of this report. However, as a matter of priority, the following 10 measures are urgently required to accelerate the implementation of the prevention process, decouple waste arisings from economic growth and reverse current trends. These are:

1. Prioritisation of waste generation and material consumption issues in national government, local government, industry/commerce and among the general public.
2. Allocation of resources for an adequate response to the current persistent increases in the quantity and harmfulness of waste arisings.
3. Immediate setting up of a Core Prevention Team within the EPA, with support from a Prevention Programme Steering Group, and adequate resources to develop and implement a comprehensive and effective strategy.
4. Development of a waste prevention strategy for Ireland, incorporating the framework elements, instruments and actions outlined in this study.
5. Development of criteria for a waste prevention audit and waste reduction plan to be a requirement of Irish business and state agencies through regulation. Such regulation to be developed and implemented in the near future, incorporating green procurement.
6. Immediate setting up of a system of differentiated charges based on volume/weight for separately collected and treated waste, supported by the adoption of regulations and a well-resourced dedicated enforcement regime.
7. Setting up a technical support service designed to provide information regarding waste prevention to Irish businesses, develop sectoral and other guidelines, carry out research, and implement training programmes for businesses and state agencies.
8. Local authorities to take account of the preventive knowledge and experience accumulated by - the Environmental Education Officers, the Government Policy

Statement *Delivering Change*, the recommendations contained within this study, the National Waste Database Reports, the outputs from the National Waste Prevention Programme and any other initiatives when the time comes to review their Waste Management Plans and thereby incorporate appropriate prevention initiatives within local/regional level action.

9. Implementation of a series of environmental charges and levies (building upon the plastic bag and landfill levies) on products and waste, implementing the polluter pays principle, and generating resources to co-fund the strategy in the longer term.
10. Development of a long-term and well-resourced research programme regarding materials and waste data acquisition, as well as several other critical issues.

These 10 priority actions are required to ensure the accelerated implementation of a prevention strategy and to provide early successes and results. However, in the medium to long term, all framework elements, instruments and actions described in this study should be considered in order to ensure that Ireland develops in a sustainable manner, providing a healthy environment and a strong economy for future generations.

CONTENTS

The matters discussed in this Main Report and Appendices are summarised in a Synthesis Report, available in print from the EPA and on the EPA website: **www.epa.ie**

1. INTRODUCTION

1.1 Background

Ireland currently faces a major challenge regarding its use of materials and energy and its management of waste. The problems relating to solid waste management, in particular, are well documented and have been quantified in several studies (DoELG, 1998, 2002b; EPA, 1998, 2000, 2001a, 2002b; Forfás, 2001; Peter Bacon and Associates, 2002). The increase in waste arisings in Ireland during the decade 1990 – 2000, no doubt influenced by the economic growth during that period, is of particular concern.

An inadequate approach to waste management, inefficient use of resources, a dependency on landfill, a resistance to change and an unacceptable level of illegal dumping are some of the inevitable manifestations of the challenging situation consequent from the growing level of waste creation that pertains to this country.

Annual increases in waste arisings (almost 10% per annum from 1995 to 2000) confirm that Ireland has not yet succeeded in decoupling waste generation from economic growth (as measured by GDP). This is in contrast to the relative stabilisation of waste arisings in some other regions where practical measures have been implemented that have been designed to arrest and reverse the growth in waste production.

As can be seen in Figure 1.1, waste disposal and energy recovery are the least favoured options of waste management. However, they remain the focal points, especially in the eyes of the media and general public, of national attention regarding waste.

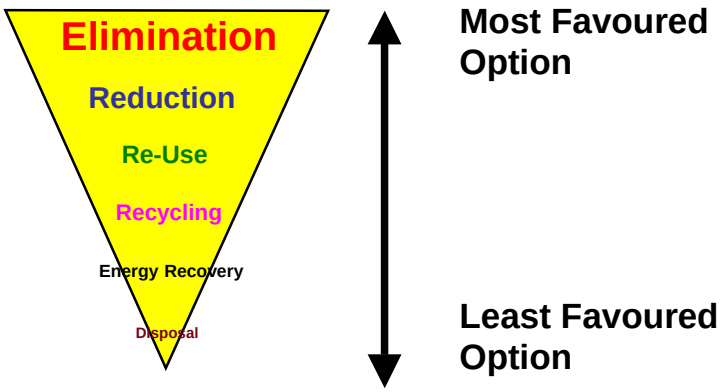

Figure 1.1. Waste management hierarchy

Disposal and recycling have been the main focus of most waste-related strategies, plans, programmes and support mechanisms that have been implemented nationally, regionally or locally in the recent past. The development of a recycling infrastructure is also being co-funded on a large scale by national government and local authorities. The Environmental Protection Agency (EPA) and Department of the Environment and Local Government (DoELG) have funded research and consultancy studies regarding recycling in Ireland, packaging waste recovery and outlets for recyclates. REPAK, (the only approved body under the *Waste Management (Packaging) Regulations 1997* for packaging waste recovery) continues to assist their commercial clients with recycling options and to aid local authorities with recycling initiatives for the domestic sector. Thus a number of major initiatives have

been implemented to move Ireland's traditional waste management practice up the waste management hierarchy, away from disposal and towards recycling.

However, prevention, and not recycling, is the cornerstone of Ireland's waste management policy (DoELG, 1998, 2002b). As stated by Minister Noel Dempsey, T.D. in the foreword to *Delivering Change*; "Genuine environmentalism starts with reduction, as did the 1998 policy statement *Changing Our Ways*. If we really care about the environment, and particularly our own local environment, this has to be our focus." The need for prevention is brought further into focus by the waste arisings and trends outlined in Section 2.

1.2 Objectives and tasks

The objectives of this desk study were as follows:

- To ascertain the current levels of waste prevention in Ireland.
- To identify the current measures and instruments being applied or planned to increase waste prevention in Ireland.
- To identify the current barriers to waste prevention in Ireland.
- To identify and analyse current preventive measures and instruments being applied in other countries and regions.
- To identify and recommend which tools and instruments could be applied in order to overcome the barriers identified and to demonstrate how they could be adapted to an Irish context.

1.3 Methodology

The findings herein are based upon a series of research activities between the period March 2002 and January 2003 including:

- Literature survey of waste-related material, in particular that relating to waste management in Ireland.
- Letter and follow up email to all local authorities requesting information regarding waste prevention activities in their regions.
- Analysis of response of several local authorities.
- Acquisition and study of all regional waste management plans in Ireland.
- Five project steering group meetings and subsequent discussions with representatives from EPA, Department of Environment and Local Government, and a local authority.
- Discussions with other relevant stakeholder groups from Irish industry/commerce, NGOs, *et alia.*
- Discussions with experts and environmental practitioners from EU Member States and the USA.
- Literature survey of waste prevention material worldwide.
- Analysis of waste prevention strategies and plans in several countries and regions – detailed analysis of The Netherlands, Denmark, Flanders and Austria including contact with agencies in those countries.

2. WASTE ARISINGS AND TRENDS

The rate of increase of waste generation in Ireland is alarmingly high. The trends in national waste arisings show a major growth in waste production between the years 1995 and 1998. Table 2.1 summarises the 1995 – 1998 growth rates (EPA, 1998, 2000, 2001a):

Table 2.1: Trends in national waste arisings (in 1,000 tonnes)

	Household	Commercial	Street Cleaning	Industrial	Total
1995	1,026	477	47	6,335	7,885
1998	1,220	755	81	9,100	11,156
Growth:	19%	58%	72%	44%	41%
Growth per annum:	5.9%	16.5%	19.8%	12.9%	12.1%

From this table, it can be seen that the growth in commercial waste, at 16.5% per annum, is of particular concern. While some of the increases in waste may be due to improved reporting methods, it is still apparent that such growth rates are unsustainable and must be initially slowed, and ultimately reversed. Industrial growth rates are also extremely high, with an annual rate of increase of 12.9%. Again, better reporting methods may have added to this perceived increase.

However, levels of commercial and industrial activities have also expanded greatly after 1998, during the so-called 'Celtic Tiger' period of increased business activity, greater affluence in the general public, greater consumerism, and population growths. While some improvements in recycling volumes may be apparent in 1999 and 2000 (Coakley *et al.*, 2002), the pressures on our decreasing landfill resources will also have greatly increased.

Figure 2.1 also shows a strong link between economic growth and increasing levels of waste generation. From 1995 – 1998 the growth in GDP was approximately 9.2% per annum (Forfás, 2001), while the growth in household and commercial waste combined (municipal waste) was approximately 11% per annum. The coupling of municipal waste and GDP over that period can be seen from the data, with growth rates of waste arisings even higher than the steep rise in economic development.

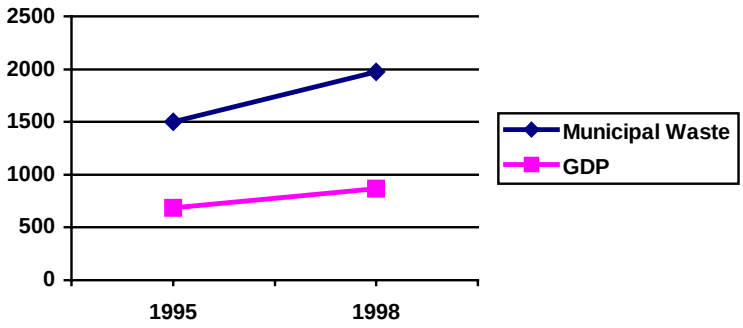

Figure 2.1: Municipal waste growths (in 1,000 tonnes) and GDP (in 100m US$) (Forfás, 2001)

More recent data indicate even more problematic trends, whereby the levels of waste since 1998 have increased further. Figure 2.2 shows this graphically.

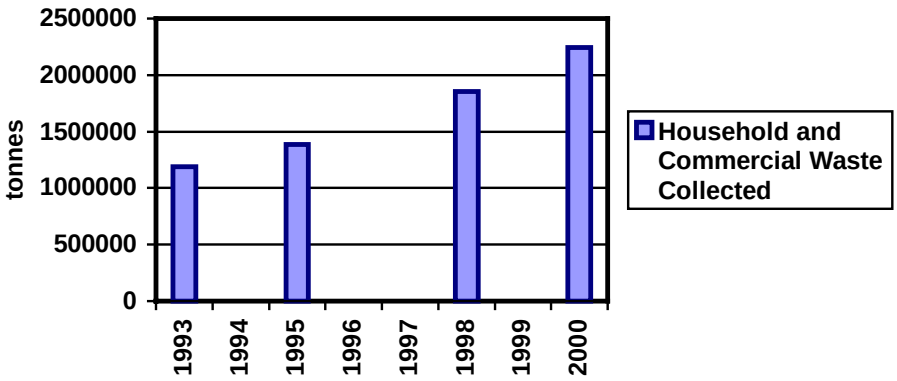

Figure 2.2: Household and commercial waste collected in Ireland, 1993 – 2000 (EPA, 2002a)

Household and commercial waste collected between 1993 and 2000 has grown from 1,186,312 tonnes to 2,242,292 tonnes – an almost 89% increase in seven years. Furthermore this does not include industrial wastes, agricultural wastes nor the volumes of waste illegally disposed of in that period. From 1993 to the year 2000, an annual increase of almost 10% for waste collected took place.

This growth can be seen in context when compared with municipal waste in Flanders, which in a similar period (1993 – 1999), grew by 27%. While in Ireland over 90% of this waste is still landfilled in the year 2000, in Flanders the landfill rate has been reduced from 43% in 1993 to 16% in the year 1999, and the recycling rate increased from 26% to 62% (see Figures 5.8 and 5.9).

It is clear from these data that the amounts of waste being created in Ireland are both unsustainable and linked to economic growth. Figure 2.3 shows the link between GDP and several environmental issues. Since 1993 it can be seen that waste arisings have closely matched GDP growths, despite the high level of economic growth in the "Celtic Tiger" economy, and the very high GDP figures due to a prevalence of multinational electronics and

pharmachem industries based in Ireland. Furthermore, it can be seen from this figure that other environmental problems have been decoupled from economic growth, such as water pollution and SO2 emissions.

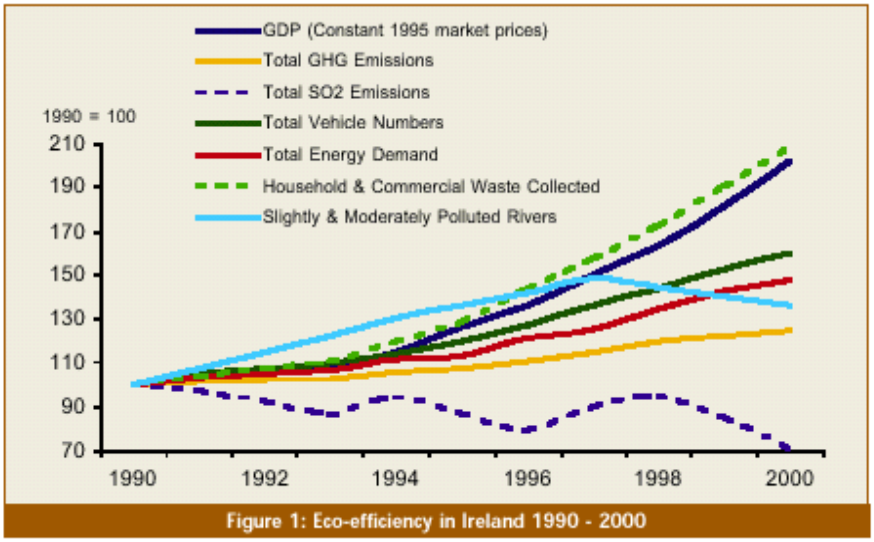

Figure 2.3. Economic growth and environmental factors in Ireland, 1990 – 2000 (EPA, 2002a)

The problems resulting from such volumes cannot be tackled alone by waste recovery. There is a need in Ireland to move further up the waste management hierarchy, from disposal and recycling to prevention. A decoupling of economic growth and growth in waste arisings is necessary in order to:

1. Reduce dependency on landfill, and its potential for environmental damage and climate change.
2. Minimise future requirements for waste incineration.
3. Reduce unnecessary usage of raw materials.
4. Reduce energy usage in the processing of raw materials and/or recovered waste materials.
5. Reduce Ireland's dependency on exporting our waste products for recycling in other countries.
6. Reduce costs associated with unnecessary resource acquisition, transport, recycling, treatment and disposal.
7. Ensure maintenance of Ireland's image as a clean, green environment.

3. WASTE PREVENTION IN IRELAND

3.1 Legislative background

3.1.1 Irish Legislation

There is now in place a formal legislative waste-related framework in Ireland which contains elements that can be conducive to the promotion of waste prevention initiatives.

This includes the following:

Environmental Protection Agency Act, 1992

While it is not in the remit of this desk study to do an in-depth analysis of the effects of this legislation, some general points, especially in relation to waste prevention, can be made.

Under this act, the EPA was established and this, for the first time, set in place a national independent agency to carry out a wide range of activities related to environmental protection including:

- Licensing and controlling large scale activities having the potential to cause significant environmental pollution.
- Advising and supporting Local Authorities in relation to management of sewage treatment plants and drinking water quality.
- Producing Environmental Monitoring programmes for air, surface waters and ground waters, estuarine and coastal waters.
- Bringing all monitoring results together and to report on the quality of the environment including trends and problems. This is done by periodic reports on specific aspects, e.g. river, air or water quality, or by a major report such as the overall State of the Environment which is published every few years.

The EPA is also required to carry out

- A National Hydrometric Programme.
- The co-ordination of environmental research.
- The control and regulation of the use and release of genetically modified organisms.
- Overseeing of the environmental activities of local authorities.
- The provision of advice and guidance on environmental problems and issues to local authorities.
- The promotion of environmentally sound practices through, for example, the encouragement of the use of environmental audits, the establishment of an eco-labelling scheme, the setting of environmental quality objectives and the issuing of codes of practice on matters affecting the environment.

The Integrated Pollution Control (IPC) licensing system is being implemented by the EPA in selected industries over 13 industrial sectors and it applies the 'polluter pays' and precautionary principles, and emphasises pollution prevention at source as the best possible option.

IPC introduced the concept of BATNEEC, best available technology not entailing excessive cost, that must be used to prevent or eliminate or where that is not practicable, to limit, abate or reduce an emission from the activity.

Each IPC licensed facility is required to produce an Annual Environmental Report (AER), which provides the public with clear summary information for the reporting year, regarding emissions from the facility, waste generation, resource use, complaints and incidents.

By the year 2001, 522 IPC licenses had been issued (EPA 2001c, 2002b) with a continuation of reductions in emissions to air from solvents, SOx, NOx, Ammonia etc.

The IPC licensing system brought about a major change in environmental practices in a wide spread of companies across several sectors. It has mainstreamed the concept of cleaner production (CP) in these sectors and CP includes waste prevention as a central tenet. It has also brought about a new level of transparency and openness in how private companies meet their environmental requirements and responsibilities. It is perceived internationally as an excellent example of a legislative-based system for the promotion of pollution prevention.

It is fair to say that this success regarding industrial licensing implementation by the EPA is now also being applied to the waste management licensing system in place since the *Waste Management Act, 1996*.

However, IPC licensing only impacts upon 500 – 600 companies at present, and there are thousands of other small scale but potentially polluting industries from a variety of sectors. At present it would seem (see Section 3.7) that some local authorities are neither adequately aware of, making contact with, nor influencing those companies which fall outside the remit of the EPA. Concepts such as cleaner production, BATNEEC, and public environmental reporting must also be applied to this majority of industries. This would be best done by improving the current single media licensing systems that are implemented by local authorities into a more integrated and preventive-focused system based upon best practice principles.

The Protection of the Environment Act 2003 further transposes Directive 96/61/EC on IPPC. The Act substitutes a new Part IV, containing the framework for IPPC licensing, for the existing Part IV.

The Waste Management Act, 1996

This act requires any industrial facility to give regard to and take reasonable necessary steps for the prevention and minimisation of waste. Regulations can be made for particular waste types or for particular activities. Regulations can also be made regarding waste audits, waste reduction programmes, use of BATNEEC, life cycle assessments (LCAs), control of substances, packaging, and producer plans.

It also imposes a general duty on all persons holding waste to do so in a manner which avoids pollution; a duty on agricultural, commercial and industrial activities to take all reasonable steps to prevent and minimise the production of waste; financial and imprisonment penalties can be imposed for pollution. The act has also given the EPA responsibility for the licensing of landfill sites - both private sites and those run by the local authorities.

By 2001, the EPA had granted 101 waste licenses and 16 draft licences (EPA, 2002b). 58 other licenses were being processed. 57 environmental audits were undertaken and 10 prosecutions took place. This permitting system has greatly strengthened the situation and has led to better data being produced and more responsible waste management.

Under this act and the subsequent *Waste Management (Planning) Regulations, 1997* each local authority in Ireland was also required to submit a Waste Management Plan for their region. Each local authority has now done so. These are discussed in more detail in Section 3.7.

Thus while some elements of this act have been applied well, and with some success, there is still even more scope to ensure greater levels of waste prevention under the act. It gives the Minister significant and previously unavailable powers to move Ireland into a more sustainable waste management era. Its enactment was a major step for Ireland to meet its international obligations regarding waste management, and in particular to achieve a reduction in the volumes of wastes arising.

Waste Management (Amendment) Act, 2001

The aims of this act are:

- To change the procedure for the adoption of regional waste management plans.
- To introduce a landfill levy, at an initial rate of up to €19 per tonne.
- To introduce a plastic shopping bag levy, of up to 19 cent per bag.
- To introduce a general clause to prohibit/limit the recovery/disposal of specified waste streams to specified types of facilities or in a specified manner. This clause can be utilised to ban landfill of certain wastes.
- To establish an Environment Fund.

In order to ensure the implementation of regional waste management plans, the making and adoption of such plans has become a local authority management function under the act. Elected members are still allowed to vary or replace a plan, but with the approval of management.

A landfill levy was implemented by the *Waste Management (Landfill Levy) Regulations, 2002.* The levy must be paid by the person who carries out the waste disposal activity. Those liable are set out in the Regulations. The initial rate is €15/tonne, effective from 1st June 2002. The levy can be increased annually by up to €5 per tonne.

The plastic shopping bag levy is implemented by the *Waste Management (Environmental Levy) (Plastic Bag) Regulations, 2001,* which specify the exact amount (15c), the type of bags exempted (bag size and intended use), and the types of outlets covered (goods sold to passengers in ports, airports, on commercial ships and aircraft are exempt). The levy can be extended to other articles. The levy is consumer price indexed and applicable since 4th March 2002.

The levies from plastic shopping bags and landfilled waste are to be directed into an Environment Fund. This fund is to be used for measures on waste prevention and reduction, operation of waste recovery activities, waste management R&D, assistance and promotion for products that are less harmful to the environment, implementation of waste management plans and the national hazardous waste management plan, litter prevention, environmental partnership projects, environmental awareness education and training, community group initiatives, and other environmental initiatives. Funding assistance will have to be in accordance with the terms of guidelines to be issued by the DoELG.

While at the time of writing there are no details regarding the amounts of money that have been raised from these levies, it is hoped that there will be substantial funds available for waste prevention and reduction projects and to support the National Waste Prevention Plan (see Section 3.5). Retailers are obliged to submit official returns on the plastic shopping bag levy within 15 working days of the relevant quarter. Accordingly, the first results were to have been submitted by July 19th, 2002 and at 3 monthly periods thereafter.

Although it is yet too soon to establish the benefits of the landfill levy regarding potential for waste prevention, the effects of the plastic shopping bag levy have been immediate and dramatic. Most estimates from retail outlets show a reduction of 90% in the number plastic bags used by the general public. This relatively small levy on a relatively small waste stream has had a dramatic effect on how we do our shopping, with almost all shoppers bringing bags with them to the shops. The main success is the fact that such a relatively small economic disincentive can have an immediate and effective beneficial effect on our waste-related day-to-day activities.

Another success of the plastic shopping bags levy may be to show individuals that they *can* take small and easy steps to effectively prevent waste. The feel-good factor related to the levy may pave the way for the willingness to use and public acceptance of future economic tools.

The fact that it was welcomed so much by the public may give future national governments and local authorities the confidence and mandate to tackle other, larger waste streams, using other such disincentive and preventive based instruments.

Waste Management (Packaging) Regulations 1997

These regulations impose obligations on any producers/suppliers of packaging or packaged products. The obligations for major producers are to operate take-back arrangements in relation to packaging waste and register with and report to the Local Authority, or else to participate in an approved waste recovery scheme. Since there are economic and other consequences for any company's operation of a take-back scheme, most companies seem to opt for participation in an approved scheme – the only one of which is currently operating being REPAK.

Again there are costs for companies joining the REPAK scheme and these relate to the amount of packaging waste produced, so this could be seen as a deterrent to waste production and could have preventive potential. However, it does seem that most companies producing large quantities of packaging waste seem to be concentrating on its recovery and recycling rather than prevention. It also seems that REPAK, in its initiatives and programmes thus far, is also placing most emphasis on waste segregation and recovery and has yet not become involved in promoting many major preventive activities. This is understandable, since the only quantitative targets in the Directive are for recycling and recovery performance.

Furthermore, it appears that the enforcement of this regulation is not what it should be. The Minister for Environment and Local Government, Mr. Noel Dempsey TD stated at the REPAK member conference, in Dublin, on October 5th, 2001: "I also acknowledge that one of the biggest problems has been a lack of enforcement of the Packaging Regulations. The legal difficulties which hindered prosecutions have been overcome. There has been seen some recent success in Dublin. But unfortunately, most local authorities have done little or nothing to advance enforcement. This has to change."

The Waste Management (Packaging) (Amendment) Regulations 1998

These regulations state that EU requirements must be complied with before packaging is placed on the market. They are based upon requirements laid out in Annex II to *Directive 94/62/EEC on Packaging and Packaging Waste*. Packaging or packaged goods must not be supplied to the Irish market unless the packaging concerned complies with essential requirements as to its nature and composition. These include:

- Packaging weight and volume should be minimised to the amount needed for safety and acceptance of the packed product.
- Noxious and other hazardous constituents of packaging should have minimum impact on the environment and end of life.
- Packaging should be suitable for material recycling, energy recovery or composting, or for reuse if reuse is intended.

Thus suppliers must be able to demonstrate that the minimum adequate amount of weight and/or volume of the finished packaging have been reached taking into account performance criteria, before they make products available to the market.

Compliance with European or other prescribed standards will be deemed to comply with the Regulations once published in the Official Journal of the European Community. There are now European standards available[1] (EUROPEN, 2001). In Annex A of *EN 13428: 2000*

[1] The CEN 'umbrella standard' (EN 13427:2000), The CEN standard on prevention (EN 13428:2000), The CEN standard on reusable packaging (EN 13429:2000), The CEN standard on material recycling (EN 13430:2000),

Packaging – Requirements specific to manufacturing and composition – Prevention by Source Reduction a checklist is provided to assist suppliers to assure that:

- All opportunities for 'prevention by source reduction' towards achieving a minimum adequate packaging weight and/or volume have been identified and considered.
- 'Prevention by source reduction' has been achieved while still meeting the necessary requirements of the packaging functions.
- Important decisive references supporting the above statement are recorded.

However, the enforcement of these regulations does not seem widespread among local authorities in Ireland, therefore the potential for reducing waste arisings due to volume and weight minimum levels is not being achieved as yet.

The Protection of the Environment Act 2003

This Act makes amendments to the Waste Management Act 1996 to strengthen its provisions, including in relation to enforcement matters. Some of the provisions of the Act which relate to local authorities in particular include:

- Explicit new powers for local authorities to make charges for any waste services, as an executive function.
- The review, variation or replacement of a waste management plan has been made an executive function, rather than a reserved function, i.e. a matter for local authority managers.
- Removes any obligation on local authorities to collect household waste from a person if that person has failed to pay a relevant waste charge. This includes not having evidence of payment on the waste.
- Waste placed for collection must bear evidence, as provided in bye-laws, of the payment of collection charges.
- In the event of there being a conflict between an objective included in a development plan and an objective in the waste management plan, the waste management plan objective will override the development plan objective, irrespective of which was made first.
- An application for planning permission cannot be refused by the planning authority or An Bord Pleanála solely on the ground that the development is not specifically referred to in the waste management plan, if the planning authority or the Board considers the development will facilitate the achievement of the waste management plan's objectives.
- Authorised persons, which includes local authorities, can board and detain vehicles in relation to enforcement of the Act. Designated members of the Gardaí are now also "authorised persons".
- Fines have been increased and there is now the possibility for the costs of any remediation required to be charged in the event of environmental pollution under the Waste Management Act.
- For prosecutions in relation to waste disposal on land when the nature of the activity and the time period involved would indicate that the disposal was carried on with the land owner's consent, this will be presumed until the contrary is shown.
- In a prosecution under the Waste Management Act, where a permit, licence, authorisation or certificate was not in force or was not being complied with in any respect, then it will be presumed, until the contrary is shown, that the carrying on of

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The CEN standard on energy recovery (EN 13431:2000), The CEN standard on organic recovery (EN 13432:2000) NOTE: these are not the full titles of these standards.

that activity was likely to cause environmental pollution.

These provisions strengthen local authorities' position with respect to issues pertaining to waste management, the management of domestic waste in particular, and the implementation of the polluter pays principle. It also allows for greater economic flexibility and the ability of local authorities to develop and implement economic instruments with potential for prevention.

3.1.2 EU legislation and policies

Prevention is also the primary focus of several European Union waste policies and directives. Since 1975 The Waste Management Hierarchy as given in Figure 2.1 above has been the basis of all official EU waste management policies. This was laid out in the two EU Waste Foundation Directives: *Waste Framework Directive75/442/EEC(Art.3)* and *Hazardous Waste Directive (91/689/EEC).*This policy has since been confirmed in several 'daughter' directives and proposed directives including: *EC Directive 94/62/EC on Packaging and Packaging Waste* and *Council Directive 1999/31/EC on the Landfill of Waste etc.*

Prevention has also formed the cornerstone of the EU initiatives: *Fifth EC Environmental Action Programme – 'Towards Sustainability'* and *The European Commission's 6th Environmental Action Plan for 2001-2010.*

In the European Commission's 6th Environmental Action Plan, under the heading *Sustainable use of natural resources and management of wastes* (CEC, 2001b) the following objective and contexts are listed: "*Objective* - to ensure the consumption of renewable and non-renewable resources does not exceed the carrying capacity of the environment. To achieve a de-coupling of resource use from economic growth through significantly improved resource efficiency, dematerialisation of the economy, and waste prevention… A strategy is needed aimed at measures, such as taxes and incentives, to ensure a more sustainable use of resources. Waste volumes are predicted to continue rising unless remedial action is taken. Waste prevention will be a key element of an integrated product policy approach. Further measures are needed to encourage recycling and recovery of wastes."

It can thus be seen that, at European level, there are many legislative, economic and programme based support mechanisms to encourage member states, including Ireland, to move towards more sustainable resource utilisation and waste management practices.

3.2 Other supportive programmes

3.2.1 Cleaner Greener Production Programme (CGPP)

From 1997 – 1998 the Environmental Protection Agency implemented Ireland's first national Cleaner Production Pilot Demonstration Programme, funded to the cost of €2.1 million. A subsequent study of the Programme (Clean Technology Centre, 2001) showed that the participating 14 companies benefited environmentally and economically from participation. As well as the financial gain from the grant-aid, the projects undertaken demonstrated reductions in pollution and the advantages of a cleaner production approach. The majority of the participating companies have continued to follow this approach, and have also adopted either informal or formal environmental management systems. However, the dissemination of the results of that programme was not considered sufficient, nor was there widespread transfer of the CP concept to other companies, especially non-IPC companies and SMEs.

That study also recommended that similar demonstration activities should be undertaken in the future, but that the structure of the programme should be altered. A longer-term, rolling programme, with multiple calls for proposals, support for cleaner production opportunity assessment as well as capital investment and active facilitation, was suggested. This

facilitation would extend from technical support and training in relation to the cleaner production approach, through assistance with reporting to dissemination activities.

Currently, the second such support programme The Cleaner Greener Production Programme (CGPP) is being implemented by the EPA under the National Development Plan 2000 – 2006 at a cost of about €4.57 million. The CGPP is offering grant aid to selected businesses (on a competitive basis) that seek to improve their environmental performance and are willing to publicise their results.

Cleaner greener production is defined in the programme as the application of integrated preventive environmental strategies to processes, products and services to increase overall efficiency and reduce risks to humans and the environment. While the CGPP is at an early stage and it is too soon to establish results, the number and quality of applications to the programme were encouraging and a number of projects were grant aided, subject to some alterations and agreements[2].

3.2.2 Enterprise Ireland incentives

Enterprise Ireland has also supported some programmes to encourage industry, especially SMEs, to move towards more sustainable methods of production and to take a more preventive approach towards waste and resource utilisation. Enterprise Ireland have offered grants to companies under the following schemes:

- *Environmental Management System Grant Scheme*: this scheme offered financial assistance to indigenous Irish manufacturing SMEs (max. 250 employees) to enable them to engage independent consultants to support and train the company's management in the installation and running of an EMS.
- *Environmental Audit and Waste Minimisation Grant Scheme*: this scheme was set up in order to provide financial assistance to manufacturing industry to enable firms to engage external consultants to carry out environmental audits of their activities. These audits can be used for the development of waste minimisation programmes; preparation for IPC license application; helping a company develop an environmental policy or EMS; or reassuring management, customers, employees and stakeholders on the environmental status of an activity.
- *Environmentally Superior Products (ESP) Pilot Demonstration Grant Scheme*: this programme was designed to provide financial support to manufacturing companies to conduct research aimed at assessing the potential for the development of more eco-friendly products from their existing or related product range.

Thus these schemes have attempted to assist companies to improve their processes and products to reduce waste and emissions and to encourage top management to make waste prevention a company priority. While there has been no formal in-depth study of the effectiveness of these programmes, or quantifying their results, it is known that several companies have utilised the financial support to move towards better environmental behaviour. Such financial aid is especially useful for SMEs to better educate themselves, learn potential opportunities to improve their processes and products and assess the impacts they are having on the environment. A study as to the level of take-up of such programmes is to be undertaken by the Clean Technology Centre for The Department of Trade and Employment in 2003.

[2] More information is available on the CGPP website: www.ctc-cork.ie/cgpp

3.2.3 IBEC awards

Another programme to increase cleaner production and promote better environmental management in industry and commerce is the *IBEC Environment Awards*. These were begun in 2000 and follow on from a similar award scheme previously run by Forbairt and Enterprise Ireland. These awards are part of an EU wide scheme that aims to foster innovative environmental practices in industry and commerce and to encourage and promote companies who develop innovative solutions to the environmental problems faced by various sectors. These awards are considered prestigious and previous Irish winners have gained competitive and publicity benefits at home and abroad while highlighting their policy commitment to innovative environmental management practices.

There are a number of awards including:

- *The Managing For Sustainable Development Award* which recognises organisations with an exceptional corporate vision and an innovative environmental management system, primarily with a commitment to ISO 14001 or EMAS certification. This category focuses on a clear integration of environmental issues into company policies and a clear measurable improvement in performance due to this policy.
- *The Eco-Design Award* which is for an original design that has significantly reduced the environmental impact of a product, service or system from any sector of Irish industry and commerce. The product could have been designed to use less natural resources or hazardous materials in its production or use; to be recycled, reused or disposed of safely e.g. packaging. The product/system may be designed to be more energy efficient in its lifetime or the design might make an existing product/system/service more eco-efficient through waste minimisation.
- *The Cleaner Technologies Award* which promotes companies that have developed and applied new technologies that allow production processes to be undertaken with a significantly reduced environmental impact e.g. increased energy/resource efficiency and reducing emissions and waste. This may involve an entirely new process or technique or the innovative application of an existing technology.

While the cumulative national effect of these awards, in terms of pollution prevention or waste reduction may not be very wide-scale, they nevertheless do provide some stimulus and incentive for companies to take a more innovative approach towards better environmental performance.

3.2.4 Construction and Demolition (C&D) Waste Task Force and Council

Construction and demolition waste is a major waste stream in Ireland. The EPA *National Waste Database Report, 1998* estimates that 2.7 million tonnes of C&D waste arose in Ireland that year, putting a huge burden on the available landfill space. The cost associated with this waste is extremely high – The Minister for the Environment and Local Government estimated it to be €1.5 billion per annum in a speech made in June, 2002.

However, as well as using permitted landfills, some elements of the construction and demolition industry, though subject to the same waste legislation requirements as other industrial sectors, appear to be also making use of non-permitted sources of waste disposal. Even when official and cost free waste C&D recycling facilities are provided (for example, in the Kinsale Road Landfill Site, Cork, as part of the DEMCON 20/20 project) they are under-utilised.

Besides the potential environmental damage that such actions could cause, they also deter other firms from acting responsibly. Those conforming to regulations are at an economic disadvantage to ‘free-loaders’. It also means that the estimated volumes arising could be less than that originally estimated in the EPA *National Waste Database Report, 1998*.

As a result of this waste, and in an effort to meet EU requirements, the Irish government, in *Changing Our Ways*, set targets for the recovery of C&D waste. These are 50% recovery by year 2003 and 85% recovery by year 2013.

A task force, Task Force B4 " Recycling of construction & demolition waste" was set up by the Forum for the Construction Industry in October 1999 in response to the challenge posed by these targets. This Task Force comprised representatives from the Department of Environment and Local Government, Construction Industry Federation, Irish Concrete Federation, Environmental Protection Agency, Enterprise Ireland *et alia*. It had the responsibility for developing the best framework strategy for C&D waste management in Ireland; for developing a coherent national plan to deal comprehensively with the C&D waste issue in Ireland and for ensuring a strategy to implement sustainable activities related to that stream of waste.

The final report of that task force was published in May 2002 (Task Force B4, 2002) and it "discusses ideas, structures, issues, recommendations, measures and target initiation dates. It should be seen as a framework document which outlines the structures and work programme of a construction industry producer responsibility programme to meet the Government's objectives for the recovery of construction and demolition waste as set out in the policy statement on waste management "Changing Our Ways"".

Most of the many recommendations in that report relate to best practice regarding administration, development of a recycling infrastructure, development of markets, good practice, awareness and education, material standards, tendering/contracting issues, support legislation and enforcement. The kernel of the report is in the 'action plan'. Thus most issues under consideration related to the proper treatment and recovery of waste after it has occurred in the industry and not prevention.

However there are also some recommendations regarding design procedures, which may have a preventive effect at source and these include:

- Develop Guidelines to facilitate the adoption of a systematic approach towards environmentally aware design in new construction schemes.
- Prevent the generation of unnecessary C & D Waste by prioritising the waste minimisation issue during all stages of the design and construction of new works.
- Take account of the future disassembly and deconstruction requirements in the design of new works.

A handbook for those involved in construction and demolition has also been produced (FÁS and Construction Industry Federation, 2002), which again focuses on waste reuse and recovery, with some suggestions also on minimisation.

A further recommendation of the Task Force was the setting up of the National Construction and Demolition Waste Council (NCDWC), membership of which would consist of those organisations represented on the present task force together with other parties identified from time to time as having a contribution to make. It is the aim of the Council to co-ordinate and lead the initiatives by the council members to implement the activities to bring about the changes necessary to achieve not only the set targets but also to involve itself in the broader environmental issues that face the industry.

The outline mandate for the NCDWC includes the following:

a) Organise, monitor, report, research, promote and demonstrate best practice.

b) Implement the recommendations and action plan from Task Force B4.

c) Develop schemes to motivate and reward companies who commit themselves to reducing waste going to landfill.

d) Organise regional and national training programmes.

e) Develop and encourage support for demonstration projects.

f) Issue annual and appropriate interim reports on progress.

g) To achieve in a tiered approach the targets set out in "Changing Our Ways".

h) To gather and issue relevant statistics.

i) To set up an appropriate scheme to identify those companies or groups engaged in successful best practice schemes.

j) To advice Government on policy issues.

k) To seek fiscal support at national & EU level for waste / recycling infra-structural projects.

This Council was established in June 2002 and as yet it is too soon to estimate the effect that it will have on the significant waste arisings from that sector. It is fair to assume that it will probably concentrate on increasing the recovery levels of waste in order to reach government targets rather than reduce the amounts arising – at least in the short to mid term.

In his speech at the launch of the Council, Minister Cullen reminded the industry that in tandem with the work of the Council he would be assessing what measures the Government needed to take to support increased construction and demolition waste recycling. He told the Council that the wholesale disposal of unsegregated waste and rubble into landfill must cease. Some local authorities already ban C&D waste disposal and new powers to introduce a national ban in this regard were now available to him under the *Waste Management (Amendment) Act, 2001* should they be required.

3.3 Research

In response to national obligations, and to support current and future policies and strategies, research programmes have been initiated by the Department of Environment and Local Government, Department of Enterprise, and the Environmental Protection Agency. The lack of waste-related data in Ireland has been initially addressed to some extent by the development of National Waste Databases, 1995 and 1998. The lack of information on some other waste issues has also been partly addressed by the series of waste related research projects commissioned by the Environmental Protection Agency, as part of the Operational Programme for Environmental Services 1994-1999 under the European Regional Development Fund (ERDF) and the Environmental RTDI Programme 2000-2006.

Some of these can have an effect on waste arisings and support measures to reduce them or treat them in more environmentally protective methods. In *Preventing and Recycling Waste – Delivering Change* it is recognised that "a number of cleaner technology and waste prevention and minimisation initiatives have already been implemented including by, or under the aegis of, the EPA, Enterprise Ireland and the Clean Technology Centre (Cork)". The Cleaner Greener Production Programme (CGPP), which is being implemented on behalf of the EPA by the Clean Technology Centre, and other initiatives are discussed in Section 3.2.

Several other initiatives, projects and programmes have also been carried out by the Clean Technology Centre (CTC) since its inception in 1992, many of which relate to methods of waste prevention and better environmental practice for industry, commerce, local authorities and society. These include prevention-based research and cleaner production-based consultancy, etc.

As a result, a series of preventive based research reports, practical supports, CD-ROMs, best practice guidelines, training manuals, workshops etc. have been produced by the Clean Technology Centre in that time (Clean Technology Centre, 2002). This adds greatly to the available Irish knowledge base of waste and emissions producers, regulators, and policy

makers – such information is crucial if informed and effective strategies and programmes can be undertaken to reduce waste and emissions in the future. It also aids those on the ground trying to reduce waste arisings and implement best practice.

Other Universities, Institutes of Technology and private organisations are also active in the area of environmental research and training.

3.4 ENGO programmes

Several Environmental Non-Governmental Organisations (ENGOs) are active in Ireland at present, mostly at a local level, and are carrying out a variety of waste-related campaigns.

3.4.1 Ad hoc ENGO campaigns

Many of these ENGOs have arisen due to local developments, such as a proposal to build a landfill site, material recovery facility, incinerator etc. in their localities. There is much current activity regarding the planning of and planning applications for such waste-related facilities due to the implementation of regional and local waste management plans and several ENGOs have now also arisen in reaction.

Many of these ENGOs are very active in their areas, very motivated, very vocal and well informed. Many anti-incineration ENGOs have linked with similar organisations in the USA and other countries and have used the Internet, academics, and other ENGOs to develop scientific and technical materials and documents to support their stances.

Since most of these ENGOs are single issue and very locally based, they are very focused and direct. Their visibility is high, due to the use of signage on roads in the areas concerned. Many have created web-sites,[3] have set up low-cost phone numbers, and are running well orchestrated media and public relations campaigns involving professional public relations companies based in Dublin and elsewhere. Recently such campaigns have involved participation by nationally and internationally well-known and well-respected local people.

Many such ENGOs usually work in direct opposition to the local authorities regarding one or more elements of a waste management plan. Most local authorities then utilise their own staff and employ consultants and public relations experts to get their message across and to overcome this opposition to the implementation of their plans. Cork County Council took a more inclusive approach in the development of a landfill site wherein they offered to provide the funding for independent consultants for the local opposition group and set up a consultative forum for discussions. The DoELG have also provided funds to ENGOs to engage consultants for the evaluation of draft waste management plans. Private developers of proposed incinerators also often invite locals to visit similar facilities in other countries to allay their fears.

In particular, such local groups tend to put pressure on local TDs and councillors, often with success. However, some of the effect of this pressure has been abated by the enactment of the *Waste Management (Amendment) Act, 2001* which has transferred the power to making and adopting waste management plans to council management rather than councillors.

While such ENGOs usually promote the role of recycling and prevention as the main alternatives to landfill and incineration, and also undoubtedly raise the awareness levels within the region regarding waste issues, it is difficult to quantify the long-term effect of such campaigns on the local community as regards better waste management practices and behaviour. Furthermore, if such groups are successful, or the issues they were campaigning

[3] e.g. http://www.bottle-hill.com/start.htm and http://www.noincinerationsouthtipp.com and http://go.to/gse (accessed on Internet, January, 2003)

against are removed for other reasons, they tend to maintain a lower profile or become dormant.

3.4.2 Long term ENGO campaigns

There are also some other 'long-term' or multi-issue ENGOs active in Ireland and many of these have an input and an opinion regarding current waste issues, policies and practices – at local and national levels.

One such group, Cork Environmental Forum (CEF) was established under the auspices of Local Agenda 21. It was set up by Cork County Council in 1997 with a stated objective: "To foster, promote and implement sustainable development within the Cork Region". Meetings and workshops take place approximately every 6 weeks at various locations around the county. Representation in the forum is from all sectors of the community, including individuals, local authorities, industry, commerce, local community groups, environmental organisations *et alia*. The Forum is currently developing a series of 'position papers' on key environmental issues. These 'position papers' intend to lead to the setting of achievable targets for environmental improvement in Cork. In its position paper on waste priorities for Cork it focuses on the reduction of consumption in general and of primary materials in particular in order to:

1. Reduce overall consumption patterns.
2. Encourage selective consumption by aiming for maximum possible use of secondary materials, durability, reparability, and recyclability, buying second-hand, hiring or sharing.
3. Minimise waste generation.
4. Reuse products and materials.
5. Recycle products and materials including composting.
6. Recover energy from waste materials.
7. Dispose safely of waste materials.

The CEF Waste Group meets regularly and is currently developing a strategy document on waste priorities for the region.

VOICE, another active group, aims to protect the Irish environment and claims to be Ireland's leading independent environmental organisation with members throughout the country. VOICE was established following the closure of Greenpeace Ireland and its current main areas of action are:

- The campaign for safe, clean water - an end the chemical pollution of rivers and seas and a halt to the continuing fluoridation of drinking water.
- Protecting natural bio-diversity by campaigning against both biopatenting and genetic engineering of our food.
- Playing a key role in the establishment of an internationally recognised ecological forestry standard for Ireland and continuing to call for the planting of more native tree species.

VOICE has forged several new partnerships with other groups and organisations. It was instrumental in the publication of the *Sustainable Ireland Source Book 2000.* It is also part of the National Waste Working Group that published the *Sustainable Waste Resource Management guide for Local Authorities* in 2001 (Earthwatch and VOICE, 2001). The Waste Working Group is a coalition of environmental groups including VOICE, Earthwatch and other concerned individuals. This report is designed for Irish local authorities to learn from the good practice of other communities in other regions by providing several best practice

case studies and examples of waste reduction, reuse, recycling, composting etc. It takes a very preventive-based approach, emphasising the importance of reducing waste generation at source, showing the major role of waste producers, but also the actions required by central and local government and the general public. VOICE also submitted detailed responses to 8 regional and local authority waste management plans.

An Taisce is Ireland's oldest, largest and one of its most wide-ranging environmental voluntary organisations. Its stated aims are to seek to educate, inform and lead public opinion on the environment, through partnership where possible; and to influence policy and development at European, national and local levels. Its activities are divided between education, planning, properties and lobbying. Some of its more high profile actions include:

- Operation of the annual National Spring Clean in which 800 schools (one third of all schools) take part.
- Ownership of thirteen important properties.
- Lobbying to save Temple Bar and much of Georgian Dublin from demolition.
- Advocation of transport systems, such as LUAS.
- Initiation of opposition to the burning of bituminous coal in Irish cities.
- Opposition of nuclear power plant at Carnsore Point and the coal-burning station at Moneypoint.
- Opposition of the interpretative centres at Luggala and the Burren.

Thus, *an Taisce* seems to be focused mainly on planning and the built environment issues and while it does not have a position paper on waste, it is active in promoting good waste management in schools (see Section 3.6).

3.4.3 Government support of ENGOs

These and other ENGOs in Ireland play an active role in shaping opinion and raising environmental awareness in Ireland on a number of topics including waste. While many are one-issue in focus and transient, they do raise awareness to the issue of waste and how best to manage it – often at the local level, which is the most effective way to do so. They also tackle the authorities, challenging perspectives and influencing waste management from a "bottom-up" approach.

The Department of Environment and Local Government has shown its commitment to the support of such ENGOs by funding awareness raising and effective engagement activities on environmental issues of national concern (Environment Bulletin, 2001). In all, £881,000 (€1.19 million) was provided to assist ENGOs in 2001. Some of the ENGOs that received funding for waste related activities in 2001 include (Environment Bulletin, 2001):

- Irish Women's Environmental Network for promoting better shopping habits and recycling awareness raising initiatives for children.
- Sunflower Recycling for promoting environmental awareness in a city centre area.
- Cork County Federation *Muintir na Tíre* to raise environmental awareness in second-level students via behaviour at home.
- Kilkenny Chamber of Commerce for a waste management business forum.
- St. Josephs Girls National School, Mountmellick for a website promoting recycling.
- University of Limerick Envirosoc for a green purchasing programme guide.
- St Kieran's Boys National School for a waste management awareness programme.
- Benwiskin Centre, Sligo to develop children's understanding of waste as a raw material for art.

- Communities Go Green to develop a waste management awareness project in Waterford.
- Rathdown Park Residents Association to promote waste reduction at the household level.

These and many other small-scale groups are active in awareness raising and developing programmes in their communities to encourage more sustainable practices.

3.5 Preventing and recycling waste – delivering change: a policy statement

This policy, published in March 2002 (DoELG, 2002b), follows on and is a major development from the previous policy statements on waste in *Changing Our Ways* and *An Action Programme for the Millennium.* The first and initially obvious step forward that this statement takes is to use the word 'Prevention' in its title. This, in itself, is a bold move and makes a declaration of intent from the national government that it means to mainstream the concept of prevention into future Irish waste management.

Changing Our Ways primarily set in place a framework and a set of policies with which Ireland could move from its emphasis on disposal towards a greater use of recycling to close material cycles. Based upon the principles in that statement, local authorities could develop waste management plans in order to decrease their dependencies on landfill, and move up the waste management hierarchy towards recycling.

This policy, however, moves Ireland another step in the evolution towards sustainable resource utilisation and waste management and sets in place a set of practical and effective principles and measures that can ensure a greater national emphasis on waste prevention and minimisation. In particular, the statement commits Ireland to reducing its overall waste production and breaking the link between economic development and environmental degradation.

This policy statement also moves away from the concept of dealing with waste after it has been created, or 'end-of-pipe' solutions. It acknowledges the 'continuing steady increase of waste production in Ireland' and the need to integrate a preventive approach to both production and consumption cycles. It sets in place a set of potential initiatives and support measures that can ensure this preventive approach, at local, regional and national levels.

The main action to ensure a reversal of the annual growth in waste arisings is the establishment of 'an ambitious and well-resourced' National Waste Prevention Programme. This comprehensive programme is to be implemented by a Core Prevention Team (CPT) within the EPA which will generate actions across all relevant stakeholders to ensure waste prevention. Included in its remit are the following tasks:

- Development of prioritised objectives.
- Identification of key contributory organisations and ensuring their engagement.
- Development of prioritised actions by the CPT.
- Co-ordinating activities of different stakeholders.
- Setting targets or performance indicators for the programme.

The Core Prevention team will also:

- Advise and contribute to policy development.
- Prioritise and target relevant activities within industry and commerce.
- Provide financial support for significant preventive initiatives.
- Support the establishment of waste minimisation clubs and networks.

- Initiate or facilitate research into effective initiatives.
- Provide support through training, help-line services, guidance documents etc.
- Finance and support R&D and demonstration projects.
- Monitor and evaluate international developments.
- Establish, finance and disseminate a best practice programme.
- Monitor and evaluate waste audits and waste reduction programmes in industry and commerce.

The Core Prevention Team (CPT) will be supported by a Prevention Programme Steering Group that will facilitate co-ordination and liaison with relevant authorities and bodies, monitor the overall thrust of the National Waste Prevention Programme and provide strategic direction.

The National Waste Prevention Programme will also be supported by legislation, under the *Waste Management Act, 1996* including the requirement of companies that fall below the threshold for IPC licensing to carry out waste audits and subsequent waste prevention programmes.

The enforcement of the legislative and producer/consumer responsibilities will be aided by the setting up of a Producer Responsibility Unit in the EPA. This unit will, in particular, focus on producer responsibilities under the various statutory requirements to implement the polluter pays principle. Other enforcement provisions under the Waste Management Acts will also be considered.

It is recognised that such a programme will have financial implications and these, in general, will be met by the waste producers, through various sectoral initiatives and also by revenue generated by levies such as the plastic shopping bag levy and the landfill levy.

Thus it is envisaged that the National Waste Prevention Programme and the Core Prevention Team will have the supportive framework of producer responsibility, economic support, sustainable and practical policies, legislation, information provision (both technical and awareness related), and enforcement required for success. This framework is shown in Figure 3.1.

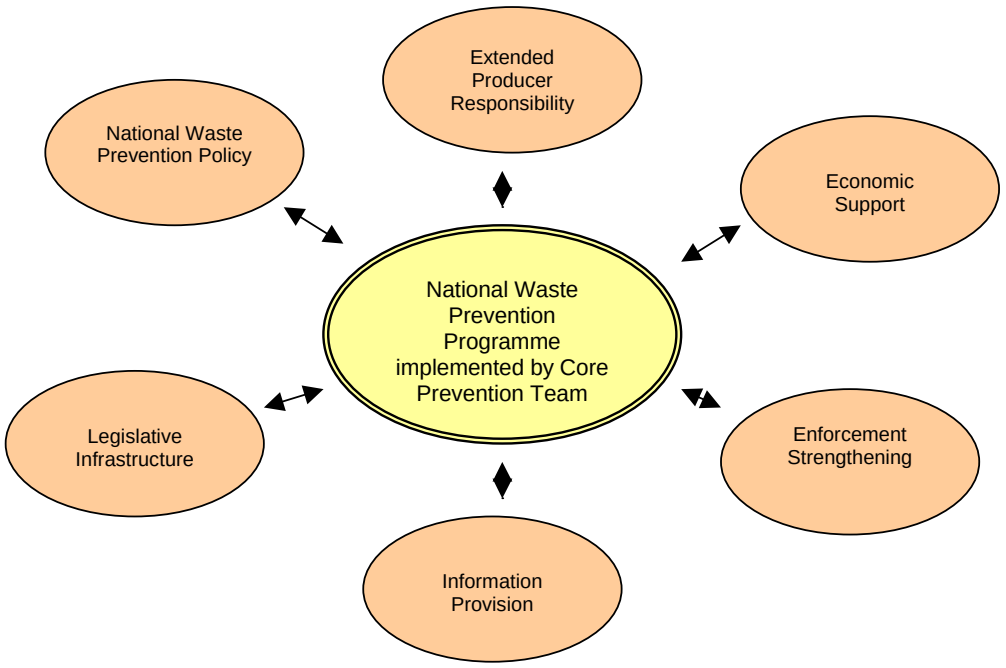

Figure 3.1. Framework for National Waste Prevention Programme

This programme has the potential, if implemented promptly and correctly, to significantly aid Ireland's move towards sustainable resource utilisation and waste management and the decoupling of economic growth and waste arisings.

3.6 Awareness raising

The link between waste prevention and awareness raising has long been recognised. People will not make constructive behavioural changes regarding the environment if they are not firstly aware that what they are currently doing is damaging. So the initial step in influencing the production and consumption patterns in society is to make the effect of their actions known to those concerned (everybody) and to try to encourage people to accept their responsibilities with regarding to the environment.

One of the main reasons for the relatively high volumes of waste production in Ireland at present and one of the main barriers to a reduction in these amounts is the low level of environmental awareness among the citizens, both in their work and their home lives.

A 1998 survey of environmental attitudes, perceptions and behaviour by the Environmental Protection Agency (Faughnan and McCabe, 1998) noted that "In comparison with the other survey populations (U.K., Germany, Italy and The Netherlands) Irish respondents performed relatively poorly in many of the domains. This was particularly apparent in relation to knowledge of environmental items." Even of those respondents with environmental awareness, 47% agreed with the statement "it is just too difficult for someone like me to do much about the environment".

There is a clear need, therefore, for a culture change - a fact recognised in the policy document C*hanging our Ways* which states that 'public involvement in waste minimisation and recovery is crucial'.

The poor levels of environmental awareness were also apparent in a more recent survey of attitudes (DoELG and Drury Communications, 2000) that presented some alarming statistics:

- Only 68% of people say that the environment is an urgent and immediate problem – this means that almost one third of the population (about 1.2 million people) believe that we do not have an environmental problem.
- Only 39% feel that they as individuals have the main responsibility for the environment whereas 42% believe that national/local government has the main responsibility – this means that almost two thirds of the Irish population (about 2.3 million people) believe that protection of the environment is someone else's responsibility.
- 56% of people never look at environmental labelling – this means that those companies who do make an effort to produce environmentally friendly products, reduce their packaging, or use recycled packaging do not gain full credit for their efforts. It also makes it very difficult to move people to more preventive practices since many of those relate to consumer trends and shopping.
- 68% of people never think of the amount of packaging on a product before purchasing – this does not create an incentive or impetus for companies to reduce the amount of packaging they use. Again this is a major deterrent to reducing waste arisings.
- 74% of people never refused a product due to excessive packaging – again this represents a disincentive to packaging minimisation and leads to higher waste levels.
- 56% of people have never conserved water in the home – this means that the amount of drinking water produced by local authorities and thus the amount of waste water requiring treatment, is far in excess of what is essentially required.

These levels of awareness and behaviour show that people do generally not consider environmental issues, either at the purchasing stage whereby waste is created, or with the environmental treatment option for the management of that waste. This means that many people are unwilling to consider recovery as an option for them, let alone prevention and minimisation. This lack of concern for the environment also means that even when good quality, less packaged and more environmentally friendly products are available, people may not use them. The fact that people do not care about the type or quantity of packaging of products they purchase ensures that the amounts of waste arisings will continue to grow at an unsustainable rate.

The lack of public participation in waste issues in Ireland at all levels deters waste reduction efforts. This lack of participation and active community involvement is prevalent in many waste reduction programmes. The commitment of the community is especially crucial, however, when planning local or regional programmes. The lack of sufficiently significant Local Agenda 21 schemes in Ireland restricts public 'ownership' of the waste issue and promotes the sense that waste management plans and strategies are being imposed from above upon the public. Local Agenda 21 principles are not always fully understood and this needs to be addressed, through community forums or by other means.

The apparent lack of transparency and openness in some regions regarding waste planning and recovery issues creates alienation and hostility to proposals and significantly reduces their suitability and possibilities for success. It was also noted that many of the waste management plans described in Section 3.7 showed a low level of public contribution and comment, as did an awareness survey in the South East (see Section 3.6.3) (Kearney Stevens Marketing Services, 2002).

Another problem caused by the lack of environmental awareness among the general public is that it may result in environmental issues not being given high enough priority among policy and decision makers. Thus the environmental implications of developments and plans are not always adequately considered and the resources required in local and national government environmental departments are not sufficient. Furthermore, when difficult decisions are required, for example regarding the imposition of domestic waste charges, infrastructural development or the implementation of eco-taxes, they may not be carried through to the fullest extent for fear that they could be resisted by the general public. When they are carried through and imposed, they are often met with acceptability and implementation problems – examples of this are household waste charges in Dublin and Cork.

Another awareness problem is that environmental issues generally are covered in the media only when a 'bad news' story occurs. When an environmental success does occur, for example in an industry achieving an industrial award, or a local authority engaging on an ambitious kerbside programme, this is not a media event. The environmental awareness and conscience of the Irish media therefore also needs to be tackled so that they can play a more balanced and supportive role.

The level of environmental awareness in Irish commerce and industry is also low. The benefits of good environmental policies, whether financial, regulatory or social are neither widely understood nor fully appreciated. The widespread acceptance that current practices vis-à-vis waste, water and air are neither sustainable nor in line with Irish and EU environmental policies has not been achieved. One of the main problems relating to industry/commerce and waste is that there is a general perception that waste is a necessary evil and fit only for disposal.

Again, as in the local/regional waste management plans, it was found that levels of awareness in industry/commerce, especially non-IPC industry were very poor. The fact that many companies are unaware of their obligations under the Waste Management Acts and Regulations means that normal legal pressures do not apply.

But making industry and commerce aware of their obligations is not enough. A level of training and education is also required so that companies not only know why they must improve practices, but also know how. Again, some local authorities as outlined below have committed themselves to this task, but the proper time, effort, resources and expertise must be applied on a more wide-scale basis.

However, no one should be under any illusion as to the huge extent of the task of environmental awareness raising both in the general public and in industry/commerce. It is a slow process and immediate results are not always apparent. In other countries where higher awareness levels are apparent, such as the Netherlands, Denmark, Austria, Germany etc. this occurred over a period of decades.

It is thus necessary to take a long-term view when considering this problem. This cannot be fully achieved in one or two year programmes. A longer-term commitment of some 10 to 20 years is necessary, together with the assurance of funding and people to make the necessary improvements.

Awareness-raising activities in other countries have resulted in a number of lessons. These are:

- A cultural change is needed in both the consumer (citizen) and the producer (industry/commerce).
- Cultural changes require an educational process, which continues over a period of years.
- An awareness-raising campaign may be seen as a start-up process. Further such campaigns are necessary and systems need to be in place to harness the support of parties motivated by the initial campaigns.
- A range of support instruments is vital to ensure the continuation of the effects of the awareness-raising measures.

3.6.1 Awareness raising at national level

3.6.1.1 It's Easy to Make A Difference

The main focus of environmental awareness raising at a national level is the *It's Easy to Make a Difference* Campaign. This campaign was initiated by the then Minister for the Environment and Local Government, Mr. Noel Dempsey TD, on Friday 10th December 1999. The aim and focus of the campaign is different to those previously undertaken in Ireland. In his speech at the campaign launch, the Minister stated that "our aim is to offer simple solutions to complex problems by bridging the gap between positive attitudes to the environment and every day action. Too often, the global and apocalyptic nature of environmental problems give us all an excuse for apathy. The campaign is designed to focus more on the solutions than the problems making us all aware of easy things, simple lifestyle changes which we can make which cumulatively will improve our environment. This can be something as simple as purchasing environmentally friendly goods, using re-usable shopping bags, taking bottles to the bottle bank or even using the shower instead of the bath".

The campaign was launched in two contrasting households to emphasise that it was focused on day-to-day lifestyle issues – one for whom environmental issues are important and in which good waste management is practiced, the other being a normal every-day household.

This reflects the main objective of the campaign which is to change lifestyle habits in the general public, in our day-to-day activities, such as shopping, use of water and energy in the home, composting, recycling etc. It is co-ordinated by the Department of the Environment and Local Government but is also designed to link with the work being done at local levels by local authority Education Officers. The campaign uses national television and outdoor

advertising, direct mail to every household in Ireland, and a benchmark study of current levels at its initiation was carried out to measure future effectiveness (DoELG and Drury Communications, 2000).

The campaign is designed to give simple, straightforward information to the general public, 76% of whom claim a concern for the environment, but only a small minority of whom actually act in a sustainable manner.

Supporting material has been developed and issued by ENFO and again this usually comprises simple leaflets and brochures giving easy tips and helpful information for people to change their everyday actions. These include: *A Better Place to Live in... Your Home and the Environment; Choices for Sustainable Motoring/Transport*; *A Shopping and Investment guide for Sustainable Living*, the covers of which are shown in Figure 3.2.

Figure 3.2. Booklets supporting *It's Easy to Make a Difference*

Another tool used in the campaign is the "10 steps" message, i.e. that there are only 10 simple steps required for more sustainable living. Various support material via booklets, a website[4] etc. are available in this campaign – these booklets are also widely distributed in supermarkets, libraries and other public areas.

While much of the advertisements on television, radio and billboards seems to focus on recycling, the 10 steps message and others in this campaign do also recommend waste prevention options related to shopping, use of plastic bags, energy conservation, water conservation and paying attention to eco-labels.

No follow up, large scale awareness study has been carried out as yet since the initial benchmark research and it is still probably too early to give definitive results regarding this campaign, especially in terms of waste prevention-related data.

However, one survey was carried out by Drury Communications, in May 2001, which examined the effectiveness of a merchandising campaign that took place in four large supermarket chains between January to April that year.

Bray was chosen as the survey location due to its good socio economic mix from rural and urban backgrounds, reflective of the national population (which is generally perceived as being 50% rural and 50% urban at this time). The focus of the survey was:

- Awareness of the link between shopping and the environment.
- Visibility of the merchandising campaign.
- Awareness of the *It's Easy to Make a Difference* campaign.

The results were interesting and as follows:

[4] www.10steps.ie

- 50% of shoppers think about the environment when shopping, 50% do not. This means that no matter what packaging options are in place, what type of eco-labels are in use or what efforts are made by shops to minimise waste, half the shoppers will not make an effort.
- 76% of people notice the amount of packaging on any item they buy and 24% do not.
- However, when asked if people make a conscious effort to buy items with less packaging, 46% said yes and 54% said no.
- 65.5% of shoppers said they make an effort to minimise waste, 31% do not think about it and 0.5% don't know.
- However, when asked how do or can they minimise waste, 83% of those who do make an effort do so through recycling, 33% by buying less packaging, 32% by reusing materials, 20% by composting and 11% by other. Thus the more concerned group do not know the difference between minimising waste and recycling (this lack of information was also noted in SMEs in a survey in one regional waste management plan described in Section 3.7), however a high percentage of people appear to recycle their waste.
- When asked to what does the phrase "It's easy to make a difference" refer, 60% said it relates to the environment and 40% either did not know or answered incorrectly.
- 69% of shoppers felt that supermarkets did not do enough when encouraging more environmentally friendly shopping, 29% of shoppers said they did, and 2% did not know.
- When asked if they ever use a reusable bag, 43% said never, 32% said always and 25% said occasionally. This answer is interesting since it indicated that 32% always use a reusable bag, even before the plastic shopping bag levy. Presumably those figures are now much different subsequent to the levy.
- When asked if they noticed environmental related signs in the supermarket that day, 27% said yes and 73% said no. This has serious ramifications if shops are to consider using such signs or if they are worthwhile. If only about 1 in 4 shoppers notice them, they do not appear to be effective, no matter what they say. Thus, other tools (perhaps economic) would be more effective.
- 67% of the shoppers were not aware of a "Shopping and the Environment " leaflet which was available in the shop, and 33% were aware of it. While this may indicate that it was not effective, perhaps shoppers may notice it in future visits etc. Of those who did notice it, 52% took it home.
- 44% of people said that they did not hear any advertising regarding environmentally friendly shopping, 39% said they did and 17% did not know[5].
- When shown a reusable bag poster, 66% of shoppers had seen it before and 32% had not.

Overall, it would appear, that with 60% recognition of the campaign, the general public is being reached and are aware if it. However as to whether or not it is making a difference – this is still in doubt since so few of the shoppers are actually making more environmentally friendly choices regarding packaging, shopping bags, environmental labels etc. However, as stated above, such campaigns take time and do not work in isolation. The combination of the plastic shopping bag levy (an effective economic instrument) and *It's Easy to Make a Difference*, (an awareness based instrument) could have a far more telling effect in provoking a change of behaviour than either one on its own.

[5] It should be noted that radio advertising was not on the air during the survey period

3.6.1.2 Other National Programmes

There are also other awareness raising schemes, resources and programmes at a national level. These include:

ENFO

ENFO is the Irish environment information office. Although based only in Dublin, ENFO also has a website and an ongoing outreach campaign which targets schools and children in particular. In its office in central Dublin (where it is also accessed by many overseas visitors and thus raises the profile of Ireland internationally) it provides several effective services and gives information from diverse sources such as the Internet, cd-roms, journals, books, reports, environmental impact statements, pamphlets, posters, videos and other in-house produced material. It encourages and welcomes group visits from classes and schools as well as facilitating meetings and workshops. ENFO was established in 1990 by the Department of the Environment and Local Government. The full list of services of ENFO are as follows:

- information desk for personal callers
- exhibition area
- children's corner with floor games and puzzles, video, colouring, pc with interactive games
- video viewing facilities
- inter-active computer games
- lecture room with audio visual facilities
- function area
- reference library with of approximately 55,000 titles, a bibliographic reference system which enables users to select most suitable publication
- study and research facilities for third-level students, researchers, consultants, journalists, environmental groups and others
- public access to the Internet
- children's section
- microfiche reading and duplicating facilities
- free photocopying

ENFO also distributes information widely, for example the series of information leaflets/fact sheets produced by ENFO are available in many public offices throughout the country, including local authority offices, public libraries, motor tax offices and some college or school libraries. ENFO participates in a number of major public events during the year. The lending system for exhibitions, videos, teachers resource packs and the maintenance of a website all ensure a national focus.

Green Schools

An Taisce run a programme for schools called the Green Flag Award, as part of the Green Schools Programme. Green-Schools is a Europe-wide project designed to encourage and acknowledge whole school action for the environment. Green-Schools is both a programme and an award scheme. The programme is intended to be adopted by any school and the award is given to schools that complete all the essential elements of the Green-Schools programme. Green-Schools is designed to make environmental awareness and action an intrinsic part of the life and ethos of a school for all its pupils. It is intended to be a long-term programme; the

award needs to be renewed every two years. The award takes the form of a Green Flag which can be flown outside the school or displayed in a foyer. Award winners also receive a certificate, a logo to display on headed notepaper, and other publicity material.

Green-Schools is an initiative of the FEE (Foundation for Environmental Education) and is referred to as Eco-Schools in most of Europe. Denmark and Ireland are the only two countries that refer to the programme as Green-Schools. Eco-Schools began as a pilot project in Britain, Denmark Germany and France. Nineteen different European Countries are now operating Eco-Schools - including many Eastern and Central European countries. At the turn of this new millennium, there are over 5,000 schools throughout the 19 countries registered for the programme.

An Taisce have been operating Green-Schools in Ireland for three years in partnership with 32 local authorities and with financial support from Coca-Cola. There are currently over 750 schools[6] (both primary and post primary) registered for the Green-Schools Programme throughout the country with 45 Irish schools having achieved the award at present.

While the primary focus of the Green Schools Programme is in environmental awareness raising, many of the projects and programmes undertaken are waste related and do attempt to make young people aware of their responsibility regarding waste production and how to prevent it. *An Taisce's* waste policy is very much geared towards taking a preventive approach and moving towards zero waste so the Green Schools campaign is expected to mirror that approach.

EPA programmes

The EPA is also involved with environmental education at a national level through the development of various educational projects and publications. Among these are:

- Schools Environmental Research Project - this is a research project that seeks to give students an understanding of how to develop a questionnaire, to identify the sample, to carry out a survey and to assess the results. The students are encouraged to choose an issue of environmental importance in their own locality on which to base their research.
- An Exhibition Centre based in the EPA headquarters in Johnstown Castle Estate, County Wexford provides information on environmental issues. Exhibitions focus on environmental issues and on the work of the Agency and others who share common interests.
- Esat Telecom Young Scientist and Technology Exhibition. The EPA sponsors an annual Special Award for the best project on environmental protection and awareness in the Young Scientist and Technology Exhibition.

3.6.2 Awareness raising in local authorities

As can be seen from the survey of regional and local waste management plans in Section 3.7 and the work of ENGOs in Section 3.4 there are many local initiatives in place regarding awareness raising. As part of this study, a questionnaire was sent to all local authorities' Environmental Education Officers regarding the prevention based work being carried out, including awareness raising. Details of this study are given in Section 3.8 below.

It appears that in some local authorities it is still the case that these officers are not dedicated to that task alone, but are also involved in other day-to-day issues in the local authority

[6] taken from the An Taisce website: http://www.antaisce.org/ in July, 2002

relating to litter, waste etc. Thus the actual time that these officers spend on a routine basis actually raising environmental awareness is limited.

Many local authority awareness raising activities are currently in place and include development and dissemination of environmental newsletters and visiting schools. Some local authorities, such as Dublin City Council, have also become involved in other awareness raising activities such as presenting stands in supermarkets in order to change shopping behaviour. Dublin City has also developed 'ecoteams' to train flat tenants in more sustainable behaviour.

Kerry County Council has a regular article in the Kerryman newspaper and also visits supermarkets informing customers of better options.

South County Dublin has provided an environmental roadshow that travels around the locality raising awareness.

Most local authorities now have web sites that provide environmental information. Some have made their waste management plans, newsletters etc. available on these sites.

The activities of local authorities seems to concentrate on (in this order):

- schools
- the general public
- commerce and industry.

Local authorities seem to be mainly engaging on a widespread basis with schools, especially primary schools. While this is very worthwhile and will have effects in the long term, it may not have any great appreciable results on its own in the short to medium term.

The general public, in particular its shopping and consumer behaviour, is a more important target group for short and medium term effect regarding waste prevention and reduction. Some local authorities seem to be more active than others in this regard. The focus of most local authorities, however is still on informing the public of disposal and recycling issues. Again, this will not reduce waste arisings.

Generally speaking, it would appear that most local authorities are only engaging to a limited extent with commerce or business enterprises, despite the fact that these are major waste producers, especially in urban areas. The information gathered by local authorities regarding SMEs and their waste activities shows that this sector can and must improve greatly for any impact to be made on waste arisings.

3.6.3 Local environmental awareness survey

A survey of environmental awareness was carried out in the South East Region (Kearney Stevens Marketing Services, 2002), in November, 2001, to provide the six local authorities concerned (Carlow County, Kilkenny County, South Tipperary County, Waterford City, Waterford County and Wexford County) with information on the South East's general public regarding:

1. Awareness of waste management issues.
2. Interest in waste management
3. Current waste management behaviour
4. Attitudes towards waste management

Some interesting results emerged including:

- 63% were unaware that a proposed waste management plan was being devised.
- 27% were unaware of the waste crisis situation.
- 18% believed that the majority of waste is being recycled or composted in the region.

- 7% believed that most waste is incinerated in the region.
- 81% were concerned about the environment.
- Waste was considered the third most important issue after public health and employment.
- 37% disposed of their waste by burning[7].
- 69% of farmers burned their rubbish and 42% of people from the ABC1 social class.
- 52% from Wexford burned their rubbish, 38% from Waterford County.
- 36% say they did not manage their waste better due to lack of facilities; 26% say it was a lot of trouble; 18% say there was no incentive to do so.
- 34% felt that waste was being well managed, 39% felt it was not being well managed and 27% did not know.
- 29% felt that they should not manage their household waste better.
- 80% expressed a willingness to sort their household waste.
- 68% felt that waste charges or bin levies were either necessary or a good incentive to manage waste better.
- 95% agreed with the 'polluter pays principle'.
- 94% would have liked to see the introduction of a multi bin or bag system to sort their household waste.
- 88% would have liked to see charges or levies for producers of excess waste.
- 84% felt that local authorities should do more to show them how to minimise or recycle their waste.
- 78% felt that shopping bags should be banned.

While it is difficult to reconcile some contradictory findings in the survey, and the findings in this region may not apply in other regions of Ireland, some important pieces of information arose.

Firstly, if 37% of people dispose of their waste by burning, this could have serious ramifications for the waste arisings data of the region (and the country if this is replicated elsewhere). While a percentage of their waste will not be flammable, and they not may burn all their waste all the time, it does appear that rural people and farmers do burn their waste regularly. If, for example, this 37% burns 33% of their waste, this would add another 11% to the waste arisings total in the region (and perhaps the country). More importantly, if people are burning PVC in this waste, they may be producing dioxins and other major pollutants on a significant scale.

It is difficult to reconcile this finding with those that indicate that 81% are concerned about the environment, 95% agree with the 'polluter pays principle', and 80% of people are willing to segregate their waste. It is important to differentiate these aspirational principles from questions of fact and behaviour. Thus the findings of willingness of charges, levies, multi bin systems etc. should be treated with caution given the actual waste management practices of many people.

Since 63% of people were unaware of, let alone had read or participated in the impending waste management plan, it is difficult to see how such a plan could be considered inclusive. This means that at least two out of every three people feel that they have no active role in deciding what they are going to be asked to do. The general ignorance of people regarding the

[7] The frequency of burning of household waste in the South East was classified as 'Yes, most of the time', or 'Yes, sometimes'.

fate of their waste (18% thinking the most of it is recycled or composted and 7% believing that it is incinerated!) means that even if they were aware of the plan, or did participate, they could not possibly do so in an informed manner.

If these levels of ignorance and poor behaviour are replicated throughout Ireland, it would appear the situation regarding environmental awareness among the public could be even worse than indicated in other surveys. However, this may be a local issue, and further research is required.

It also appears in this survey, that recycling and composting seem to be presented as the best options regarding waste. It is as if the waste management hierarchy stops at recycling and reuse, and that reduction and prevention are not currently viable options. The words 'reuse', and 'prevent' (or 'prevention' or 'reduction') do not appear in any question – the work 'minimise' appears once as a small part of one question. This is also alarming if this region is ever to tackle the issue of waste growth. It also appears to confirm the impression from the waste management plans below that recycling and composting form the main focus of the plans, with less emphasis on methods to reduce the increasing volumes of waste arisings.

3.7 Local/regional waste management plans

Under *The Waste Management (Planning) Regulations, 1997* and the *Waste Management Act, 1996* each local authority in Ireland was required to prepare and adopt a Waste Management Plan for their region. Since the enactment of the *Waste Management (Amendment) Act, 2001* all of those plans have now been adopted. *Inter alia,* in respect of waste prevention, each plan, according to *The Waste Management (Planning) Regulations, 1997* is explicitly required to:

"describe measures in support of waste prevention and minimisation carried on by the local authority and, to the extent that information is available or may reasonably be obtained, by business and industry, and give an assessment of the impact of such activities." (Part, 2.3)

Furthermore, each plan is required to include: "the effect of measures to prevent or minimise waste production or the harmfulness of waste". (Part 3)

The Regulations also require that each plan shall include information on or otherwise have regard to: "(a) the promotion of public awareness and dissemination of information and advice regarding waste prevention, minimisation, segregation and recovery, in liaison with other bodies as appropriate, (b) other measures in support of waste prevention, minimisation and recovery, including infrastructural development and the provision of support, assistance or incentives to householders and private interests". (Part 5.3)

While each plan is also required to include targets for waste recovery, waste prevention targets are not required.

Since prevention, as mentioned above, is the cornerstone of Irish waste management policy and forms the basis of the *Waste Management Act, 1996,* it could be expected that even if not legally required, each regional or local waste management plan would give much detail on the preventive measures planned by each local authority in any case. A study of the plans submitted, however, show a great disparity in the amount of information given and in the quality and extent of the actual preventive activities planned, despite these legal requirements. The effects or impacts of such activities, although required, is given in very few plans as can be seen from the summaries below.

The plans examined and their locations are shown in Appendix I.

Connaught

In the Connaught Waste Management Plan, in the section relating to prevention and minimisation, information is given regarding a composting initiative in County Galway, a

bring bank network in County Mayo, the Sligo Recycling Project, and bring sites in County Roscommon, despite the fact that none of these relate to prevention.

In Section 7.3.2 of the plan, on page 46, on prevention in industry and the requirements of companies under the *Waste Management Act, 1996* and *Waste Management (Packaging) Regulations, 1997*, it is stated that many industries are "either unaware of these obligations or simply have not responded due to lack of enforcement of the Regulations to date by the local authorities. Generally these companies are not involved in waste minimisation activities".

The plan does include some measures that may result in a more preventive approach to waste in the region including the appointment of an Environmental Education Office in each local authority, the appointment of a Regional Waste Management Officer, an internal waste audit in each local authority, graduated charging mechanisms, and enforcement of the "Packaging Regulations". The plan also includes development of a recycling infrastructure without stating how this can lead to waste prevention.

However, for none of the above measures does the plan include information regarding "an assessment of the impact of such activities." nor "the effect of [such] measures to prevent or minimise waste production or the harmfulness of waste", in direct contravention of the Regulations under which the plan is required. Nor are any waste prevention or minimisation targets given in the plan[8]. Since prevention is such an important element of an integrated waste management strategy, these would be very useful to aid the authorities to measure their progress regarding prevention.

There seem to be conflicting figures regarding the projected waste arisings in Connaught. In Section 8 of the plan, the 1999 household, commercial and industrial waste growth rates are given as 2%, 0.5% and 1% per annum. These are far below the national trends shown in Table 2.1 in this report. As stated on page 55 of the plan, the figures for Connaught are then all expected to be reduced to 0.5% growth per annum by 2005 and "pass to zero in the following periods".

However the targets in Section 12 of the plan (page 89), regarding implementation, indicate a projected increase of waste household/commerce arisings of 26% by the year 2013 (or 1.7% growth per annum), which will be treated by end-of-pipe solutions such as thermal treatment (52.7%), recycling (44.6%) and landfill (2.7%). In Section 12 of the plan, the projected growth of industrial waste by 2013 is given as 37% over 14 years, or an annual increase of 2.2% per annum, which will be dealt with by recycling (27%), thermal treatment (29.2%) and landfill (43.8%).

Cork City and County

The waste management plans of Cork City and County perform reasonably well in meeting the requirements of the *Waste Management (Planning) Regulations 1997* and seem to show a greater commitment to a more preventive approach regarding waste management. For example, in both plans the proposed activities are listed as are their effects and benefits. The active environmental awareness campaigns currently underway in both areas are described in detail and Cork County Council makes a commitment to develop Waste Prevention Guidelines for specific sectors of the community.

Both local authorities also seem to show a reasonably good understanding of what prevention and minimisation entails and Cork County Council describes the barriers to prevention – a key issue when identifying methods to overcome them. Cork City Council (formerly Cork Corporation), in its plan, also makes a commitment to lead by example in terms of developing an environmental management system within its own organisation and states: "As tangible proof, therefore, of the Corporation's commitment to waste reduction, the local authority will

[8] As stated above, these are not required under the regulations.

ensure that the waste avoidance measures communicated to the public by its information campaigns will also be fully and pro-actively adopted with respect to its own activities. In other words, Cork Corporation must be treated like any other waste producer".

Cork County Council appears to be one of few local authorities to have already and pro-actively worked with non-IPC licensed industry in its region in order to ensure a more preventive approach and has ensured cleaner production training and development in all those companies with emission licenses in the county. It has also actively promoted waste prevention via the planning process and makes a commitment to setting "attainable waste preventive targets for sectors of the community in order to encourage and sustain waste prevention and minimisation at source". Both local authorities commit themselves to legal, informational and economic based actions in order to reduce the waste being produced in their regions.

Neither plan unfortunately sets any targets regarding the outcomes of the waste prevention measures either already underway or to which they have committed. In the County Cork plan, household and commercial waste arisings are estimated to grow at the same level as predicted economic growth rates of 5.5% and 5% (this is clearly an underestimate for the years 1998, 1999 and 2000). The total growth expected between 1997 and 2004 is from 96,273 tonnes to 137,409 tonnes (a growth of 42.7% over 7 years or 5.2% per annum) (page 106). However, it is stated that prevention targets have not been taken into consideration in these figures.

The waste growth estimates for Cork City include the potential impact of successful waste avoidance measures and an annual growth of 3.5% for household and commercial arisings are given in the plan (pages 119/120). Thus the plan estimates a household and commercial waste growth from 1997 to 2003 of 134,735 tonnes to 171,645 tonnes (already, it would seem clear that these projections are a major underestimation with current (2001) projections[9] running closer to 45.3% over 7 years or 5.4% per annum).

However, the prevention potential of the wide range of activities described in both these plans is possibly greater than that of most others.

Donegal

The Donegal waste management plan outlines a number of short term (1-3 years) measures regarding waste, relating mostly to landfilling and data collection. 10 actions are described with respect to "waste prevention and recycling", however these mostly relate to waste collection, recycling, composting and data collection. No waste prevention actions are outlined.

The plan states: "many of the actions necessary to directly influence levels of waste production and hence waste minimisation are beyond the direct powers of local authorities" (Section 4-3 of the plan).

Nor does the plan describe the effect of the composting, collection and recycling activities.

As regards targets, the plan notes national rates per annum in the 1995 and 1998 EPA National Waste Databases of 7.7% growth in household and commercial waste. It then projects four possible municipal waste arisings changes for Donegal of annual increases of 0%, 1.5%, 3% and 4.5%. It states: "the previously derived value of 4.5% is considered appropriate to Donegal and accommodates the uncertainties over trends in waste growth rates".

[9] given in a presentation by Michael O'Brien, Cork City Council to Cork Institute of Technology: *Waste Disposal Current and Future*, 26th November, 2001

The plan thus estimates a growth from 40,000 tonnes in year 2000 (99% of which is landfilled and 1% recycled) to a total of 96,000 tonnes in year 2020 (44% of which will be thermally treated, 27% recycled, 21% composted and 8% landfilled).

Dublin

The Dublin Waste Management Plan states that the Dublin Local Authorities, shall "subject to resources being available, implement policies and objectives to meet the national and EU waste hierarchy of waste minimisation, recycling, energy recovery and disposal" (Page 9).

Current prevention and minimisation actions regarding households focus in the Global Action Plan (GAP), which is based upon work by EcoTeams – small groups of neighbours who meet over periods with a trained coach to examine and modify their consumption habits. Other current incentives include shopping campaigns, and a booklet (*The Art of Waste Prevention*). Current initiatives with industry focus on the IPC licensing system, being implemented by the EPA, and do not seem to indicate existing local authority engagement with the many commercial, retail and industrial companies outside the IPC system.

Future plans with communities include: a public education programme, support and funding for local initiatives, GAP implementation, public information provision, reporting on recycling achievements, fostering minimisation attitudes through schools, home composting, monitoring and reporting on community activities, lectures, seminars and open-days, support of Local Agenda 21 activities etc.

Future plans with commerce include: communication with waste producers by various means, implementation of Packaging Directive, graduated environmental charges, waste minimisation awareness raising in SMEs, inspection of facilities by local authority personnel, enforcement of licenses, planning conditions, bye-laws and permits.

In the local authorities themselves, each will implement an EMS, use an environmental purchasing manual, give instructions to staff on waste minimisation, etc.

Thus a wide spread of activities for various sectors are planned, at a significant cost, but more detail on these would be required to assess their effectiveness regarding waste reduction potential. The effects of these actions are not specifically detailed in the plan, despite being required in the Regulations. However, further detail on waste minimisation is given by Dublin City Council (formerly Dublin Corporation) in their *Dublin Waste Management Strategy Reports*, including options for households and industry as well as best practices noted in Europe. The options considered to exist for Dublin include: IPC licensing, implementation of the packaging Directive, graduated environmental charges, awareness raising in the general public and businesses, setting up co-operative groups, inspections of industrial facilities by the local authority, and enforcing licenses.

The Dublin region plans to reverse current growth trends (estimated currently at an annual increase of 2% per annum for household waste, 1% for commercial waste and 1.5% for industrial – all significantly below the national levels shown in Table 2.1). These figures are identical to several other waste management plans despite Dublin being an area of significant growth in population and commercial activity, especially since 1997. Dublin local authorities expect to reduce these rates to zero growth by 2007-2011. This reduction is outlined in Table 3.1 and again is identical to some other waste management plans.

Table 3.1: Reduction in waste growth rates (targets for 1998 – 2011) for Dublin region

Period / Waste Type	*1* *1998 – 1999*	*2* *1999 – 2002*	*3* *2003 – 2006*	*4* *2007 - 2011*
Household	2%	1%	0.5%	0%
Commercial	1%	0.5%	0.5%	0%
Industrial	1.5%	1%	0.5%	0%

Kildare

The Kildare Waste Management Plan states the planned "effect of measures to reduce waste arisings or the harmfulness of waste" (Page 50) can be developed by the following:

- Various national legislation and policies regarding trends in waste management and the private sector.
- Pending European Community Acts (regarding biodegradable waste; banning of certain substances from landfill and the requirement of pre-treatment of landfilled waste).
- Promotion of public awareness, including schools programme and enforcement of the Litter Pollution Act.
- Infrastructure support including composting scheme, local skips scheme, litter bins scheme, wheeled bins for residents, tidy town grants, kerbside collection and recycled bring centres.

There is a lack of concrete preventive measures outlined, apart from a commitment to review disposal charges as an economic incentive for waste prevention. The Council, however, does make a commitment to carry out an internal waste audit in its own activities and publicise its findings, as well as develop an environmental management system.

The impact of the activities proposed is not outlined, and the forecasted arisings of household waste from 1999 to 2018 is 72%, or an increase of 38.5% per capita over that period (or a growth of 1.7% per annum). Commercial waste arisings are expected to grow from 23,364 tonnes to 40,194 tonnes (an increase of 16,830 tonnes or 72% over that period or 2.9% per annum). There is no detailed justification for these predictions, but perhaps they were developed in an earlier draft or a strategy document that preceded the plan.

Midlands

The Midlands Waste Management Plan outlines the current waste minimisation initiatives in the region by describing

- Current legislation.
- The aims of the EU Operational Programme for Environmental Services for Ireland 1994 – 1999.
- Awareness raising in various counties and kerbside collection in Nenagh and Thurles.
- IPC license requirements for industry.
- Results of some site visits to industry (almost identical to those described in the Mid West Plan – see below).

Future policies to promote waste prevention and minimisation include, for the general public: awareness raising activities, graduated environmental charges (pay per amount arising), and

the establishment of a reuse/repair centre. At industrial/commercial level, a Regional Industrial Waste Minimisation Officer will be appointed jointly by the five local authorities. This person will promote waste minimisation and cleaner production in all industries in the region, in particular SMEs. Landfill bans will also be applied for certain streams. Industrial ecology parks will be stimulated. Eco-design will also be encouraged and producer responsibility will also be applied. Measures to ensure waste prevention and minimisation by the local authorities will also be undertaken, including: an audit of each local authority, staff education, meeting legislative requirements, and development of guidelines in a booklet.

While the impacts of these worthwhile measures are not outlined, it must be stated that, for the most part, they have proved effective in other regions outside Ireland. However, greater detail as to how they will be applied would also be required to estimate their effects and a commitment to review their progress over the life of the waste management plan.

Taking population trends into account, the Midlands plan estimates the growth of current household waste arisings at about 3% per annum. As a result of the waste prevention activities described, this growth is expected to decrease to 1% per annum between 2010 and 2013 and eventually move towards stabilisation. Commercial growth, currently estimated at 2% per annum (i.e. 8 times less than the national average) is also expected to reduce to 1% per annum by between 2010 and 2013. Industrial waste in the region, with an estimated annual growth rate of 1.5% (again much lower than the national average in Table 2.1), is expected to begin decreasing by 2012 to a rate of -0.5% per annum. These targets, as is the case with Dublin, are quite ambitious.

Limerick/Clare/Kerry (Mid West)

Being very similar to the Midlands, the Limerick/Clare/Kerry plan describes the current situation regarding waste prevention and minimisation as involving:

- Current legislation including the *Waste Management Act, 1996* and *EPA Act, 1992*.
- The aims of the EU Operational Programme for Environmental Services for Ireland 1994 – 1999; Cleaner Production Pilot Demonstration Programme and Better Environment Awards for Industry.
- Awareness raising in various counties and litter control schemes.
- Results of some site visits to industry (more or less identical to those described in the Midlands Plan) showing a low awareness of waste minimisation in general, confusion between recycling and minimisation, mixing of wastes after initial segregation and a lack of audits.

The specific programme regarding waste prevention and minimisation includes, at community level: various awareness raising programmes; a pay per weight programme; and a composting programme.

At business and industry level, a Regional Industrial Waste Minimisation Officer will be appointed, with similar duties as that proposed in the Midlands including promoting waste minimisation and cleaner production in all industries in the region, in particular SMEs. Companies will be encouraged to carry out internal waste audits and must comply with the Packaging Regulations. Demonstration programmes for cleaner production will be initiated.

Local authorities themselves will be required to reverse their own waste growth trends, raise internal environmental awareness and improve in-house practices etc.

The region (as is the case with Dublin) will aspire to the Green City concept with Limerick City as the focus – details of what this will entail are not given.

As is the case with most other plans, the impacts of all these activities (many of which are worthwhile and effective if implemented properly) are not detailed. Strangely, regarding

targets and current waste trends, both are identical to those for the Midlands for household, garden, civic amenity, commercial and industrial arisings. Limerick, Kerry and Clare counties estimate the current household waste arisings at about 3% per annum. As a result of the waste prevention activities described, this growth is expected to decrease to 1% per annum between 2010 and 2013 and eventually move towards stabilisation.

Commercial waste growth, currently estimated at 2% per annum (i.e. much lower than the national average in Table 2.1) is also expected to reduce to 1% per annum by between 2010 and 2013. Industrial waste, currently increasing at an annual rate of 1.5%, is expected to begin decreasing by 2012 to a rate of -0.5%. As is the case in the Midlands plan, these trends are given in percentages only – actual future estimated tonnages are not given.

North East

To develop waste prevention and minimisation within Cavan, Louth, Meath and Monaghan, the local authorities themselves commit to:

- A waste audit – to establish baseline waste generation in Council offices and departments, and to pinpoint areas where improvement is required.
- Waste re-use and recycling programmes to be developed in-house, to cater for materials such as paper, food waste, packaging wastes etc. Targets for waste reduction to be set based on audit findings.
- Purchasing policy of the Councils to be reviewed to favour:
    i. minimisation of waste entering the establishment
    ii. favouring the use of recycled and environmentally friendly materials.
- Infrastructural projects – the Councils will strive to use recycled material where appropriate (such as recycled aggregates, street furniture made from recycled plastic etc.) in infrastructural works undertaken by or on behalf of the Council.
- Development of an EMS in each local authority.

Initiatives in industry, either started or planned include:

- Waste audits.
- Demonstration programmes.
- Continuous improvement through systematic waste minimisation both concerning production.
- Waste and packaging waste.
- Segregation of waste intended for recycling.
- Increasing awareness of possibilities to change product design in order to achieve more environment-friendly products in small and medium sized industries.

For household waste prevention and minimisation, programmes of environmental awareness raising and education are planned, as well as anti-litter initiatives. Education Officers will be appointed in each local authority. Graduated environmental charges will be implemented – no details are given. No impacts of these activities and programmes are developed in the plan. As regards targets for waste arisings, the growth rates estimated for household waste for the years 1997 to 2005 are for an annual increase of 3% up to 2001 and an annual increase of 2% from 2002 to 2005. Again these are identical to the rates for the Midlands and the Mid West. Likewise the estimated rates for commercial waste which will decrease from the current 2% per annum growth in 1997 (again significantly less than the national rate) to 1.5% per annum growth in 2005.

Industrial waste trends are also identical to the Midlands and Mid West, with growth rates per annum to decrease from the current 1.5% per annum to 1% per annum by 2005. The basis for these figures is not given and again they seem very low.

Various economic instruments are briefly discussed in this plan and their advantages, disadvantages and evaluation are briefly outlined. However, of these, it appears that only use-related service charges will being implemented by the local authorities – nevertheless, that is a useful tool. These instruments are summarised in the plan (Section 9.4 of the plan) and are given in Table 3.2.

Table 3.2. Potential economic instruments for sustainable waste management

Economic Instrument	Advantages	Disadvantages	Evaluation
Service Charge Fixed	Easy to implement and administer.	No incentives to reduce or recycle waste. May encourage fly tipping.	Can be readily implemented.
Service Charge Use-Related	Strong incentives to reduce and recycle waste especially when weight-related. Easy to implement and administer if charges are related to bin sizes.	Volume-or weight-related charges require measurement and individual billing. Limited incentives to reduce and recycle waste if charges are related to bin sizes. May encourage fly tipping	Can be readily implemented.
Landfill Tax	Strong incentive to divert waste from landfill.	Not effective at local level, needs national approach.	Cannot be implemented by Local Authorities or Department of the Environment and Local Government. (Dept. of Finance)
Producer Responsibility and Voluntary Agreements	Minimal costs. Potential to reduce waste and achieve high recycling/ recovery rates.	Not proven to be effective.	Can be implemented in the region but would be more efficient at national level.
Product or Packaging Taxes	Strong incentives. Applicable to many products/types of packaging.	High administration costs. Careful impact assessment required. Reduced competition unless import/export prices adjusted. Not effective at local level.	Interferes with REPAK scheme.
Recycling Credits and Subsidies	Strong incentive to recycle.	Risk of over-promoting recycling, requires monitoring.	Interferes with REPAK scheme.
Deposit-Refund Scheme	High rates of waste separation.	No incentive to reduce waste. High implementation and operation costs. Only applicable to certain products/types of packaging. Resistance from industry.	Interferes with REPAK scheme.

South East

In the existing arrangement regarding waste prevention and minimisation in this region, several activities are described within the various local authority areas such as: awareness raising, composting, infrastructural support, landfill restrictions, school visits, anti-litter campaigns, tidy towns campaigns, recycling facilities etc. Many of these do not relate to prevention, but are included in that section anyway. Regarding what may be achieved, the plan seems to indicate that national and EU level programmes will account of most of, if any, waste avoidance achieved. It states: "The waste categories and quantities are those *unavoidably* generated in a developed society" [our emphasis].

In Section 12 of the plan, under the heading "Prevention and Minimisation", the plan lists some concepts behind EU strategy, as well as the objectives and targets of the 6th EU Action Programme. It also states that "Section 9 of this plan dealt with the concept of 'source reduction' and 'producer responsibility'"(page 214). However Section 9 of the plan deals with Waste Generation Forecasts. The plan will implement these concepts by local authority:

- Encouraging voluntary source reduction programs in businesses/industry.
- Endeavouring to foster the ethos of producer responsibility.
- Encouraging source reduction in the community.

No details of how these may be achieved are apparent in the plan, but a detailed description of an awareness campaign 'Wiser Ways' is given in Section 13 of the plan.

As regards waste arisings targets for the region, forecasts are made for the years 2002 – 2021. No information regarding how these forecasts were made is given in the plan itself, apart from: 'cognisance was also taken for forecasts in other EU countries, in particular the UK and Denmark'. Waste minimisation and reduction is accounted for in these figures, but as to what extent, it is not stated. Thus there is no impact, either qualitative or quantitative, given for the waste avoidance measures outlined (such as they are), despite this being explicitly required by the Regulations.

For each year between 2002 and 2021 a compound increase of 1% per annum is predicted. It should be noted that non-compounded increase figures are given also, varying from 2% to 3% depending on the stream. These predicted growths of 1% per annum seem very low, especially for commercial waste arisings, when compared with the actual growths of the 1995 and 1998 National Waste Databases (see Table 2.1) and the low levels of preventive activities indicated in the plan.

Wicklow

Wicklow addresses the current waste prevention and minimisation programmes in Section 2.5 of the plan and states that the Wicklow County Council is involved in 'several programmes and initiatives aimed at preventing and minimising waste throughout the County' (page 62). This is done through education, awareness raising, information provision and liaison with business and industry – the details of the nature of this liaison are not outlined. One measure is the limiting of two refuse sacks per week to householders and a ban on commercial waste at Wicklow Co. Council landfill sites. However not all household waste is collected in Wicklow by the local authorities and private operators have no such waste limit. The local authority also runs a waste minimisation programme at its County Buildings and also has carried out composting trials. Some individual initiatives by three private companies are also briefly described.

As regards implementation of the waste minimisation policy described in Section 4.6.3 of the plan, the focus is mainly on awareness raising and education. Composting is also included in that section. The impacts of the awareness raising and other measures are not described.

As regards waste avoidance targets, the plan (in Section 3.3) states that the rate of growth nationally has been 2-3% per annum based upon EPA reports – details are not given, nor the source of the reports referenced, nor does this tally with the estimates given in Table 2.1 of this report. The local authority aims, through awareness raising and the introduction of use-related charges at the household level, to achieve a 0% growth rate per capita by the year 2012. The actual current growth of overall household waste is not estimated. Current commercial waste growth is estimated at 3% per annum (in comparison to an annual growth rate of 16.5% nationally from 1995 – 1998 in Table 2.1 above). Despite significant increases in population and tourism, this rate is expected to decrease to 1% by the year 2007. The current rate of industrial waste increases is estimated to be 2% and this is expected to decrease to 0% by the year 2012.

These current estimates seem very low given national trends and the decreases seem very ambitious given the relatively low level of waste avoidance activities planned.

3.7.1 Summary of local/regional waste management plans

As can be seen from the summaries above, many of the local authorities appear to be underestimating the current waste growth rates in their regions. For this reason, and since they do not quantify the impacts of their proposed actions – which in some cases, appear less than comprehensive – it is difficult to see how they can achieve the types of waste avoidance success predicted. Furthermore, many of the 'preventive' actions that they propose, such as anti-litter campaigns, composting, recycling etc. do not, in fact, relate to prevention and will not achieve any reduction in waste arisings – these are methods to deal with waste after it has arisen. Many of the plans also propose shifting the main methods of waste management from landfill to a combination of thermal treatment, recycling and landfill and they do not emphasise the need for or describe how best to reduce the waste arisings.

In these respects several of the plans, for the most part, do not appear to conform to the principles of sustainable resource management set down in various EU programmes, plans and legislation. Nor do they seem to conform to the prevention principles laid out in the two Irish national waste management policies (*Changing Our Ways* and *Delivering Change*). Nor is it apparent how they meet the requirements of the *Waste Management (Planning) Regulations, 1997* with regards to prevention.

As regards the targets for waste arisings reduction in Ireland, *Sustainable Development: A Strategy for Ireland* (1997) states that "waste management policies will achieve: stabilisation of municipal waste arisings by 1999, and their reduction by 20% by 2010" (DoE, 1997). Thus, for sustainable development it is considered that not only must the growth rates in waste arisings be reduced, but significantly reversed.

None of the plans, even the most ambitious ones, appear to meet this requirement for sustainable development. The reason is that none of the plans appears to put enough emphasis on prevention and the implementation of measures that are essential to reduce the amounts of wastes arising.

3.8 Local authority activities

As well as examining the plans of regional and local authorities and future activities, it was considered worthwhile to find out what actual actions are currently being taken by local authorities in their own area. Thus a request for information was sent to all local authorities in Ireland asking what prevention, waste reduction, Local Agenda 21 and awareness raising activities were occurring in their regions. This request was sent to the Environmental

Education Officers in 35 local authorities by post and a follow up by email. Information was received from 19 of the 35 local authorities contacted (or 54% of local authorities in Ireland).

The kind of activities being carried out in the regions from whom information was received was varied. One common element in each region is the visiting of schools to raise environmental awareness among school children. All Education Officers are promoting waste prevention as the best option in these visits to schools.

Home composting is being promoted in 16 of the 19 regions. An environmental newsletter to the general public is being disseminated in 8 regions and copies of these were sent. They are primarily used for the promotion of recycling, to notify the public regarding waste collection issues, to advertise the work being done by the local authorities and to make the public aware of any programmes or projects being undertaken. A free, reusable shopping bag is also being distributed by three local authorities.

Some notable actions by some local authorities, which could lead to prevention and reduction are also:

- Enforced waste separation at source for domestic and commercial entities.
- Zero waste housing estate pilot programme.
- Increase in landfill charges.
- Commercial material stream waste bans.
- Kerbside collection programmes.
- Banning of commercial and industrial waste landfilling.
- Ban of commercial cardboard.
- Move to use related charges (from flat charges).
- Green procurement programme.
- Pay per bag (use related charge).
- Green procurement policy.
- Pay per weight system (to be introduced in 2005).
- Pay per use system (€6 per bag).

Of these, it would appear that the pay per use systems of household charges that have been implemented in at least three local authorities have the highest potential to reduce waste arisings from the domestic sector, and these should be welcomed.

It is assumed that volume related charges are in place for most, if not all, commercial and industrial waste in most local authorities and this should also reduce waste arisings over time if illegal dumping is also tackled.

However, while awareness-raising is prevalent at various levels in almost all local authorities and Education Officers have been appointed, many of the other commitments in the various regional waste management plans were not included in the responses received. For example, no mention was made from any local authority regarding serious waste prevention programmes for commerce or industry, nor the appointment of Regional Industrial Waste Minimisation Officers that were committed to in some regional plans. Little engagement with the major waste producers from SMEs, commercial enterprises, retail outlets etc. was reported despite the fact that these are a significant source of solid waste and the Regulations require local authorities to outline how this sector will reduce its arisings.

Overall, from the information received, many local authorities currently have room for improvement regarding waste prevention initiatives within their regions. However, further investigation is merited, especially with regard to the local authorities from whom information

was not received. Further research is also recommended to find more detail on the results of some worthwhile initiatives, such as use-related charges etc.

3.8.1 Survey of local authorities

In 2001 and 2002 Woods Davies Consultants carried out a survey of waste related awareness and education activities by local authorities (Davies, 2003), with funding from the EPA, through the ERTDI Programme. This project aimed to "provide a summary of the marketing, educational and research activity that local authorities are conducting to promote awareness of waste issues and maximise participation in waste reduction initiatives". The survey was carried out via questionnaire, phone calls and meeting with local authority Environmental Education Officers. Some results of this study were as follows:

The highest priorities for local authorities regarding waste were stated as (in order 1 to 3):

1. The lack of landfill space.
2. The lack of a market for the recyclable waste collected.
3. The lack of convenient recycling infrastructure.

It is interesting to note that the lack of landfill space is considered a higher priority than the amount of waste arising.

A major concern was noted regarding the difficulty of changing behaviour and increasing awareness without a sufficient infrastructure. Education Officers perceived a dearth of opportunities for the general public regarding waste reduction (e.g. most or all products were over-packaged). Another perception of Education Officers was that, generally, people expressed concern, but did little to improve their own behaviour. This is similar to the findings in the survey described in Section 3.6.3 of this report.

The main reasons for poor public behaviour were considered to be:

- A lack of convenient infrastructure, which would make it easier for the public to reduce their waste.
- A lack of awareness or belief in the need to reduce waste.
- A refusal to accept the concept of "individual responsibility" towards waste generation and reduction. Hence a reluctance to pay waste collection charges, costs for recycling development etc.
- A resistance to change and laziness (waste reduction takes time and effort).
- A lack of fiscal incentives to generate less waste.

These findings are interesting since they seem to indicate that better information and communication combined with a better collection system (e.g. kerbside) would probably have a major effect. The reluctance to pay charges is also of note, but if economic instruments were applied (such as pay per volume, for example) it could stimulate change.

The main reasons for an inadequate public participation rate in the initiatives and programmes in place were perceived to be due to a lack of:

1. [genuine] concern by the public for the environment
2. public awareness of the need to reduce waste
3. a kerbside-recycling scheme
4. knowledge
5. time to separate and store recyclable waste
6. convenient recycling banks
7. education in schools on waste issues

This reiterates the findings from the previous question where no initiatives were in place. Again the importance of separate collection and convenience is stressed along with awareness, concern and knowledge.

The factors that contribute to inadequate public awareness of waste reduction were considered to be lack of:

1. personnel in local authorities
2. a promotional budget
3. budget to measure the effectiveness of current activity
4. information on how to design an effective waste campaign

This is not unexpected since there is, at most, one Education Officer per local authority, often trying to service a large population and often required to carry out other functions relating to recycling, landfills etc. – unrelated to awareness raising. Such a lack of resources is noted as a barrier also in Section 4 of this report.

The most effective methods to reduce waste generation were considered to be:

1. Developing or extending civic amenity sites.
2. Developing or extending a kerbside recycling scheme.
3. Promoting awareness of the need to reduce waste.
4. Extending recycling banks.
5. Education seminars on waste with schools.
6. Education seminars on waste with general public.
7. Promoting home composting initiatives.
8. Having a centralised composting facility.

Unfortunately, this appears to indicate a lack of understanding of what is meant by reduction and confuses waste generation with waste disposal or landfill. For example, recycling and composting are recommended here as ways to reduce waste, but neither constitute prevention – rather, they offer alternatives to disposal. This reiterates the main concern noted above: the lack of available landfill space.

The types of activity used to communicate local authority plans and programmes are listed in Table 3.3. It can be seen from this that Environmental Education Officers use several methods in order to promote better behaviour and the use of local initiatives. In particular, use of the press and media was considered most effective, perhaps because it reaches a high density of population, relatively cheaply.

Table 3.3 Activities used to communicate local authority plans and programmes

Advertising Medium	Number of LAs who conduct this activity	Rate in terms of effectiveness	Rate top five activities
Local Press advertising	23	1	1
Education seminars in school	23	1	
Local Radio advertising	23	1	2
Discounted composting bins	22	1	
Press articles	21	1	3
Competitions aimed at children to promote home composting	6	1	
Education seminars with the public	20	2	Note[10]
Competitions aimed at schools to promote recycling	18	2	
Environmental newsletter	17	2	4
Public consultation meetings	16	2	
Website on waste	14	2	
Direct mail leaflets sent to homes	14	2	5
Poster advertising	11	2	
Roadshows on waste	10	2	
Promotional widgets e.g. Stickers on bins	10	2	
Competitions aimed at householders to promote recycling	10	2	
Competitions aimed at householders to promote home composting	10	2	
Parish leaflets	9	2	
Television interviews	6	2	
Billboard Advertising	4	2	
National Radio advertising	3	2	
Television advertising	1	2	
National Press advertising	15	3	

[10] Several local authorities observed that:

1. Schools seminars etc work very well if framed within the Green Schools programme.
2. Public seminars work well if they are delivered to specific resident and other community groups.

Large open public seminars do not work very well at all and are largely a waste of community effort. They may be desirable from the political open information and involvement opportunity viewpoint. There was a perception that the general public do not attend them, instead the same faces from special interest groups keep reappearing.

3.9 Summary of waste prevention in Ireland

The most recent waste arising trends give cause for concern and are unsustainable. The growth in waste arisings and the past dependence of landfill to dispose of over 90% of this waste are not tenable in the long term. There is also a clear link between the volumes of waste arisings and the economic growth Ireland has been experiencing in the past decade.

However, while past performance may have left much to be desired, it is also now clear that there are instruments and tools coming on stream with some potential to impact on those trends.

The policy document from the Department of Environment and Local Government: *Preventing and recycling waste – delivering change* is a major breakthrough in these efforts, in particular through the proposed implementation of a National Waste Prevention Plan. With the proper implementation, such a plan, with support from well focused and resourced instruments, could have an effect for greater resource efficiency and the dematerialisation of Irish society in the move towards more service-oriented and less resource dependent lifestyles. These will also play a key role as Ireland moves towards a more integrated product policy approach. **The speedy implementation of this policy statement is highly recommended**.

The 1996 and 2001 Waste Management Acts and their associated Regulations provide a valuable and potentially effective legal basis upon which progressive and sustainable actions can be taken by regulators, waste producers and consumers, as does The Protection of the Environment Act 2003. The licensing and permitting systems set up under this legislation have greatly improved waste management practices and data. At a local level, other legislation such as commercial and waste stream bans in landfill sites could also eventually lead firstly to waste recovery and eventually to waste reduction.

However, not all of this legislation is being put into effect fully and there seems to still be an unacceptably high level of illegal dumping, and non-enforcement of the 1997 and 1998 Packaging Regulations.

Future EU based regulations are also pending and will create further pressure for waste producers and lead to a more ‘polluter pay principle’ approach and extended producer responsibility.

The economic levies that have emerged from this legislation such as the plastic shopping bags levy and the landfill levy also have great potential. The plastic shopping bag levy appears to have been a major success and engendered a ‘feel-good’ factor among the general public that could pave the way for further fiscal disincentives. Landfill charges are being increased widely and use-related waste charges are also now appearing in some local authority regions for domestic as well as commercial waste producers. Again these should lead to waste reductions, in time. Since the monies from these charges go into an Environment Fund, they can also create potential future investment in prevention measures. Supportive economic mechanisms such as those implemented by the EPA (e.g. Cleaner Greener Production Programme (CGPP)) and Enterprise Ireland (e.g. Environmentally Superior Products (ESP)) can also have a beneficial effect. These can also add to the awareness and information tools available to companies to increase their implementation of cleaner production and eco-design.

Awareness levels seem also to be rising, despite some indications in one region and the *It’s Easy to Make a Difference* campaign has achieved high levels of recognition. Education Officers have been appointed in most local authorities, but their activities need to be more widespread and focused on awareness raising only. DoELG and local authority support for the awareness raising activities of many small-scale ENGOs is also on the increase.

Environmental research levels are also increasing in Ireland through European Commission based programmes, EPA ERDTI programmes and Enterprise Ireland support. The information

and support materials produced from this pure and applied research should aid the efforts of policy makers, programme planners and those implementing plans on the ground.

The current range of policy, legislative, economic, awareness and information based tools and instruments is summarised in Table 3.4. However, further and better work is required on the ground. **Local authorities and companies must take a more preventive approach towards the waste problems that many of them face and the current waste management plans do not go far enough in that regard. Local authority engagement with commercial and industrial waste producers in particular requires serious attention. A detailed assessment of these plans is required and the five-year review of all plans should focus in particular on their preventive elements and their approaches to waste reduction for all sectors.**

Table 3.4. Instruments with potential for waste reduction being applied in Ireland

Basis	Instrument
Policy	Preventing and Recycling Waste – Delivering Change National Waste Prevention Programme Local/Regional Waste Management Plans
Legislation	Waste Management Acts, 1996, 2001 Environmental Protection Agency Act, 1992 Waste Management (Packaging) Regulations 1997 Waste Management (Packaging) (Amendment) Regulations 1998 Protection of the Environment Act 2003 Waste Permitting and Licensing Current and future EU legislation Local Authority Landfill Bans
Economic	Plastic Shopping Bags Levy Landfill Levy Landfill Charges Use related waste charges EPA and Enterprise Ireland Grant Programmes (e.g. CGPP, ESP)
Awareness	It's Easy to Make a Difference Education Officer programmes ENGO local programmes ENFO
Information	ERDTI Programme DoELG Reports on LA21 etc. EPA Reports and Documents CTC Reports and Documents Forfás Report etc.

4. BARRIERS TO WASTE PREVENTION

4.1 Introduction

As discussed in Section 2 above, waste arisings in Ireland continue to grow unsustainably and are very closely linked with economic growth. While several instruments are being applied (including policy statements, legislation, awareness-raising programmes, economic based incentives, and information-based tools), it is clear that at present, they have not yet succeeded in overcoming the barriers to sustainable resource management, and decoupling waste from economic growth.

This Section of the report outlines the main barriers to waste prevention apparent in Ireland today, with the objective of subsequently identifying potential tools and instruments that can be applied to tackle them.

4.2 Barriers to recovery

In a previous ERTDI study[11] several barriers to increased levels of waste *recovery* were identified and discussed. There are many such barriers to the collection, reuse and recycling of waste materials in Ireland today. Some of these are material specific, such as the diversity of plastic waste streams. Others, such as a lack of environmental awareness, affect the recovery of all waste streams.

Table 4.1 lists the 14 barriers that were identified as being a hindrance to the increased collection, reuse and recycling of waste materials in Ireland given in the final report of that study (Coakley *et al*, 2002):

Table 4.1. Barriers to recycling in Ireland

General Barriers to Recycling in Ireland		
No culture of recycling	Small island, dispersed population	No paper production
Cheap, easy disposal	Low environmental awareness	Infrastructural deficiencies
Lack of research	Lack of information provision	Lack of standards
Technical barriers	Lack of green public procurement	Lack of economic instruments
Lack of legislation, lack of enforcement	Lack of extended producer responsibility	

Furthermore, several barriers to specific waste streams were also identified in that research project. These are listed in Table 4.2.

[11] Assessment and Evaluation of Outlets for Materials that can be Recovered from Municipal Waste (2000-MS-8-M1)

Table 4.2. Barriers to the recovery of specific waste streams

Material	Specific Barriers
Glass	Green glass market; contaminants; mixed colours; insufficient bring sites; awareness levels; insufficient markets
Textiles	Awareness levels; personal nature of textiles; infrastructural deficiencies; throwaway society; lack of research
Ferrous Metals	Insufficient collection systems and bring sites; economic barriers; lack of collection facilities for WEEE; economic problems for WEEE collection; price fluctuations
Paper	No paper production in Ireland; price fluctuations; false public perceptions of recycled paper; lack of research
Cardboard	Insufficient cardboard production in Ireland; price fluctuations
Plastics	Many plastics on the market; non suitable for food packaging; large fraction of mixed plastics; energy value of plastics recovery; contamination; limited potential demand; low virgin plastics prices
Non-ferrous metals	Lack of WEEE collection facilities; economic problems with WEEE recovery; low awareness: hazardous materials
Aluminium	Lack of collection systems and bring sites, collection facilities; lack of support instruments; lack of awareness; waste characterisation of aluminium waste stream
Wood	Prevalence of contaminated wood; lack of wood waste segregation; lack of legislation implementation
UBCs	Little waste segregation; contamination; no paper mill in Ireland; nature of composites (different materials); poor infrastructure

Many of these barriers, in particular the more general ones, also apply to waste prevention. However, since the nature of waste prevention means applying measures and initiatives through the full life cycle and not just tackling the end use and disposal of waste, there are also some other barriers to be met along the way.

4.3 Main barriers to prevention

There are two main barriers to waste prevention in Ireland at present and both are inter-related. Only when these two critical barriers are overcome can the other social, technical and more specific barriers be tackled. They are:

Lack of prioritisation and resources

While it cannot be described as a tool or instrument as such, one of the main driving forces behind the successes in waste prevention in the four regions discussed in Section 5 is, without doubt, the prioritisation of the environment in general and waste and raw material consumption in particular as a major societal problem and one that must be solved.

This is a first and vital step in the development of any policies, strategies or plans, since if the decision is not made at the highest levels of society that the environment matters and is our most precious asset, then the problems will not be solved. While it is outside the remit of this project to study why environmental issues in general and waste issues in particular have become such a high priority in Denmark, Netherlands, Flanders and Austria, the fact remains that they have. It may be related to a longer history of industrial activity or it may be due to geographic, demographic or social issues. It is most likely as a result of high levels of environmental awareness, which drives bottom-up forces for change. Nevertheless the concern for the environment and subsequent dedication and passion shown in those regions was the main reason for their success.

Only if environmental issues are given the priority required at many social levels, such as political, educational, in the media, among the general public and in business, will real change be apparent and will solutions arise. One of the main manifestations of such concern and priority is in the level of resources allocated to solving the problems at hand.

It is clear that the ambitious, detailed and comprehensive strategies and plans that have taken place in the regions considered in Section 5 were expensive and required a high level of resources. It is also clear that these resources were forthcoming via the general public, national and local government and through business. While business may have been reluctant to co-fund the programmes and initiatives discussed, the public and governmental strength of support behind them was such that the strategies were accepted and implemented.

In Ireland, despite the many public difficulties outlined on almost a daily basis in the media, environmental protection is still not allocated the high level of priority that is apparent elsewhere. In recent times this seems to be changing due to pressures from the European Commission, ratification of international agreements such as the Kyoto Protocol, a higher awareness level in society and a growing recognition that, in the past, this was a neglected feature of Irish life - wherein the high quality of the environment was perhaps taken for granted.

However the inclination to consider recycling and disposal alone as the main sources of waste-related solutions urgently needs to be altered, so that resources are not mis-allocated towards options that will not achieve sustainability and will not solve our problems in the long term. This misconception is especially prevalent in local government where the concept of prevention has not yet adequately permeated.

The lack of prioritisation and inadequate resources allocated to environmental issues is the most important barrier to waste prevention, efficient resource utilisation and sustainable development in Ireland today.

Lack of administrative system

Another feature of the approaches to raw material utilisation and waste management elsewhere is the setting up of administrative systems, bodies and agencies specifically dedicated to tackling these issues. It became clear to Flanders, for example, as long as twenty years ago that a dedicated waste management authority was required to tackle this problem in the long term on a regional level - hence the creation of OVAM in 1981.

Likewise within local authorities, extensive and well-resourced administration systems have been put in place in many regions. For example in the Netherlands, large waste management and environmental protection departments were developed by municipalities in the 1980s with adequate resources and well trained personnel to manage waste at a local level, by intense interaction with the general public, a high-level of engagement with commerce and industry, raising awareness levels, delivering information, carrying out research, developing expertise,

working with schools etc. The successes in these and other countries did not occur overnight, nor without structural change.

With the development of the EPA in 1993 and its engagement with industry in 1996, through IPC Licensing, a new era of environmental protection was created in Ireland. The *1996 Waste Management Act* brought this a stage further whereby the EPA engaged with local authorities through landfills and other waste issues. Thus national government created a structure and administrative system to manage environmental issues at a national level.

However, local authorities have not followed suit and have not, as yet, made the kind of radical changes to their structures, or provided the necessary allocation of resources, to match this change at local level. This may be due to other pressures, for historical or social reasons, due to a perceived lack of environmental pressure at a local level, or due to a lack of foresight - but the creation of dedicated, well informed and well-funded waste and environment departments is rare among local authorities in Ireland. While local authorities may argue that they would need more funding from national government, the relative lack of priority given to waste prevention and the lack of resources allocated by local authorities is an internal problem.

A lack of expertise is also notable and widespread, especially in relation to prevention, (with some recent exceptions - especially involving Education Officers). The misconception still seems to be in place that waste is a technical or engineering problem, rather than a social issue that will only be solved by mindset change, involving different value systems and subsequent behavioural patterns of consumption.

The proposed Core Prevention Team, as described in Section 3.5, is a major advance with regard to developing waste prevention strategies at a national level. However better and more prevention focused allocation of resources at local level are also required in order to develop innovative, ambitious and effective local and regional waste management plans on a par with those prevalent in some other EU Member States.

4.4 Other barriers to prevention

In order to improve prevention or waste reduction levels, it is necessary to consider the relevant raw materials as early as possible in the life-cycle of a product or service, prior to its end-of-life stage. In disposal and recycling, end-of-life is the main area of focus, but to ensure the highest level of prevention, systems are required to also devise measures for the use, sales, manufacture, resource acquisition and design stages of products and services – taking account of transport issues also. Waste prevention potential is apparent in sales through packaging reduction. Waste reduction in the manufacturing stage is usually tackled by cleaner production and cleaner technologies.

However, in prevention, it is also necessary to target resource acquisition issues, in particular when looking at specific raw material streams, such as hazardous materials, materials sourced from long distances, non-renewable materials etc. This is especially true when attempting to reduce the energy demands of products and transport. Design issues are also important when increasing service levels per product, dematerialisation etc. Since such a diverse range of options is available in prevention at so many levels, a commensurate number of barriers also appear.

It must be remembered that the main goal of a product should be to provide a specified level of service – and not to provide just the materials themselves. A motor vehicle is not just a mixture of different materials – it is manufactured to provide a specific service: transportation. Waste prevention means using less material in achieving the same service

levels of products i.e. greater resource efficiency. Thus a lighter motor car ensures prevention without any loss of service.

Prevention can also mean changing the kind of services we require from our resources, by dematerialisation or a more service-oriented approach, which requires lower material intensity – for example, by using public transport rather than individual motor cars, when possible. Thus new and potentially more complex social and lifestyle barriers become apparent when discussing prevention, barriers that require a somewhat different approach from that traditionally taken to improve disposal methods.

Other barriers to waste reduction and prevention in Ireland at present include the following:

The throwaway society

Irish people now live in a 'throwaway society'. In previous generations, Irish people had a greater value for materials and an abhorrence of waste. Since it has become an affluent society, however, Ireland has forgotten, in a relatively short space of time, the old truism: "waste not, want not". Now people in general, and young people in particular, are primarily interested in convenient and fashionable products that are 'new and improved'. The demand today is for new and bigger cars, new and bigger houses, new and bigger TVs, new and faster computers, the latest mobile phone and football shirt etc. The fact that the products being discarded and wasted are in perfect working order and still have the capacity to carry out the service for which they were 'required' is not an issue. And while this preference is related to a lack of environmental awareness, the idea is prevalent in Ireland that if something is even slightly old then it must be inferior, and is not desirable. Thus it is thrown away. Furthermore, since, for the first time in its history, people on a widespread scale can afford 'new and improved' products and services, then these are demanded, whether or not they are required, and irrespective of the consequences, including the creation of more waste.

The convenience society, 'on the go'

Another element in modern society is the growing demand for convenience and the changes in day-to-day lifestyles as a result. Nowadays, everything is 'on the go'. People are eating on the go, banking on the go, shopping on the go, telephoning on the go etc. Convenience eating, convenience shopping, convenience communicating etc. are the norm, but this has an add-on effect of more waste, more packaging, more products etc.

For example, since hot and convenient takeaway food is required at all times in towns and cities, from garages, supermarkets etc. food suppliers must have large volumes of pre-cooked and readily available food available at all times. Food is now no longer prepared only after it is requested. Rather, an immediate and easy choice is demanded and the profits from such fast food are such that suppliers can afford the subsequent large wastages.

Shopping is now available 24 hours a day, 7 days a week, using the Internet, shopping TV channels etc. Shops are also open 7 days a week and for longer opening hours. This ease of access accompanied by greater levels of affluence, means that shoppers are acquiring products they do not really need, but that look attractive or have been well marketed and advertised. Many of these unnecessary products are quickly discarded and become waste.

Another consequence of these trends is the greater need for packaging associated with convenience foods and unnecessary products. Since society is moving towards single item packaging (packaging for one biscuit, one sandwich, one pastry, one bar, one piece of fruit, one sweet etc.) for convenience and to be consumed 'on the go', this has led to an increase in packaging volumes. Since this range of products are particularly expensive, producers can afford to spend more on packaging per item, and this packaging is also used for promotional

and marketing purposes. Indeed, in many cases, these items are charged on a weight basis and the consumers actually pay for the packaging also.

Social/demographic changes

Ireland has undergone a major social upheaval in the past twenty years, with significant economic changes and subsequent behaviour and consumer patterns. Clearly the arrival of the so-called 'Celtic Tiger' economy has increased affluence and spending along with raw material and product consumption. Obviously this has led to a growth in waste.

One effect of higher affluence is the growth of the built environment and this has had a major effect on waste for several reasons. The building industry is a large raw material consumer and the large numbers of new houses, roads, apartments etc. has had a considerable effect on waste arisings. Secondly, all these houses require energy, water, heating, furniture, fittings and appliances, again leading to massive consumption, waste and emissions. Thirdly, many people are now acquiring second homes, summer houses etc. which are not being used for much of the time, despite being fully fitted and furnished.

Another feature of affluence is the change of domestic patterns whereby the numbers of people per residence or home has also decreased, with young people moving out of the family home at a younger age due to financial independence. Thus nowadays the parents are often left alone in relatively large homes for several years, while each sibling lives alone or with a single partner in another house or apartment. Whereas twenty years ago a similar family, of say five people, would occupy two homes, now they occupy five, with a large volume of 'free' space. And these new homes are often moving further away from workplaces, which has a major effect on transport patterns, with longer commuting periods, traffic congestion, as well as greater consumption of motor vehicles, fossil fuels etc. and higher consequent waste and emission levels.

This means that the material intensity per service (MIPS) has massively increased with only one or two people using houses, gardens, energy systems, water systems, waste-water systems, vehicles, refrigerators, washing machines, computers, etc. and a lower density of people per area in the built environment. Such a low density and high material usage leads to serious environmental pressures including waste.

Cheap and easy disposal systems

While landfill charges have increased greatly in Ireland in the last few years, and continue to rise, the landfill option is still relatively cheap and easy in comparison with some other EU Member States, especially for domestic waste producers. Since the application of the landfill levy, these charges continue to grow, and some landfill bans are now in place for specific waste streams and commercial waste. However, the charges and other disincentives being applied are sometimes only dependent upon the amounts of locally available landfill.

Despite these deterrents, the waste disposal industry continues to prosper. It is a well-established, profitable, large-scale and competitive industry in Ireland and still offers relatively good prices to those seeking to dispose of commercial or industrial waste to landfill or for export. These disposal companies have large fleets of trucks and skips and can service waste producers well and effectively. While the law in Ireland has been made more stringent by the *Waste Management Act, 1996*, and the *Waste Management (Amendment) Act, 2001*, in many cases it is still expedient and profitable to dispose of waste as a sole option without consideration to prevention, or minimisation.

Low levels of environmental awareness

The issues regarding the low levels of environmental awareness in Ireland, and their consequences, are discussed in detail in Section 3. The programmes in place at national, regional and local levels are also described. However, while the current serious problems regarding waste may not be solved, in the short term, by awareness raising alone, it is also clear that the general ignorance of and apathy towards waste among the general public and smaller industries cannot continue if any medium or long term improvements are to be secured.

Infrastructural deficiencies

Unlike some other EU Member States, Ireland has only relatively recently begun to seriously consider the issue of waste and to develop national and local policies for higher levels of waste recovery. This means that the infrastructure required for widespread segregation, collection and reprocessing is still at a very early stage.

Thus, for example, the numbers of household waste kerbside schemes in Ireland is still quite low. The numbers of separate wheelie bins or other containers for segregated wastes are currently insufficient to develop such schemes. The number of bring-sites for materials is also quite low per capita compared with other countries. The bring sites in place are also often inadequately managed with litter and full receptacles.

Because of this poor infrastructure, it is too easy for people to just put their waste in the nearest bin, at home or at work, where it is then reliably collected and disposed of. If people just put all their waste into one bin, they are simply not aware of this waste, in particular the waste volumes and types. One of the first steps in any move towards waste reduction and prevention is waste awareness, and segregation is a well proven way of making people aware of their own waste. For example, bringing glass containers to the bring centre often represents the first step of citizens in taking responsibility for waste management.

In many countries waste segregation is a legal requirement and mixed waste is simply not allowed. Household and commercial mixed waste is not collected. If waste contractors are found to be carrying mixed waste, their licenses are revoked. In Ireland, some local authorities such as Galway are demanding that householders segregate their waste and the local authority will not accept mixed waste where the alternative of kerbside recovery of certain streams is available. There are some indications that a kerbside collection pilot scheme in Galway has led to a reduction in the waste amounts produced, but this requires further research and verification.

However, before the legal requirement for waste segregation is imposed upon a community, the infrastructure must be in place to recover such separate streams. This infrastructure can thus lead to awareness and then reduction, with the support of other legislative, economic and information-based tools.

Lack of research

Waste prevention is a relatively new concept and much research is required in order to learn how this approach can be mainstreamed into the day-to-day activities of people in their homes and their work. The Clean Technology Centre has been researching and promoting a preventive approach since 1992 and some of its work described in Section 3, but very few other Irish organisations are carrying out such prevention focused activities in a meaningful way.

Some research funding programmes are now currently running in Ireland, including the ERTDI Programme under which this study was initiated. This research should be ongoing,

however, and further quality information at a variety of levels is required in order to develop and implement new strategies, policies and programmes, especially those related to waste reduction and prevention.

Lack of waste data

When investigating how to reduce or prevent waste, one of the most important issues is to learn how and why this waste is being generated in the first place. In general, accurate reliable data on resource usage, waste arisings or amounts recovered are notoriously difficult to acquire – not only in Ireland, but in other countries that have been collecting such information for some time. These data limitations are well documented (Resource Recovery Forum and ENVIROS, 1999; European Topic Centre on Waste, 1999; IPTS, 1996). Resource Recovery Forum and ENVIROS, 1999 states: "The current literature acknowledges the limitations of collecting waste management data. This includes a lack of completeness of member state data, poor harmonisation of definitions, differences in sources of data and a lack of consistency in data collection methodologies." The adage "what cannot be measured cannot be managed" also applies to waste and high quality, up-to-date data are a prerequisite for effective strategies, plans, programmes and individual measures.

This data deficit is now being tackled in Ireland with the publication of National Waste Databases, State of the Environment Reports, Environment in Focus Reports and the EPA acquisition of data from local authorities on an annual basis to identify trends and pressures. In another ERTDI research project[12,] Irish non-household municipal waste is being characterised by The Clean Technology Centre. The data from that study will greatly aid local authorities and national government to direct future waste reduction programmes and instruments. An important deliverable from that study is the methodology to carry out future tracking of such waste.

Lack of materials flow data

As stated above, in order to identify effective methods to reduce and prevent waste, it is necessary to understand how and why the initial resources are being used. In effect, it is necessary to be able to track these resources from the moment they enter the Irish material chain (e.g. through import) until they are eventually disposed of.

Methods are in place to measure economic growth such as Gross Domestic Product (GDP) that provide information on whether national income is growing or declining. This allows effective social, economic and financial planning. However, policy and other decision makers have a limited knowledge idea of the material requirements of modern economies and few indicators of where, or when, physical constraints are likely to be reached. The initiation of regular studies and reviews of trends has improved this situation somewhat.

A study covering Austria, Germany, Japan, the Netherlands, and the United States (World Resources Institute, 2000) found that physical accounts are urgently needed, because our knowledge of resource use and waste outputs is surprisingly limited. It is necessary that Governments set up a parallel set of national accounts in physical terms using material flow accounting.

One such study is being carried out by the Clean Technology Centre[13] into the development of a set of tools based upon material flow accounting (MFA) i.e. accounting for the physical flow of materials through our economy and society.

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[12] *Characterisation of Non-Household Municipal Waste in Ireland and the Development of an Approach to Tracking Municipal Waste Composition (2000-MS-7-M1)*

[13] *Desk Study on Materials Flow Accounting - Demonstration for Ireland, 2001*

Such monitoring tools are necessary in order to:

- Measure progress towards sustainable development.
- Make/review policies and decisions toward sustainability.
- Optimise the use of resources.

Without such tools it is not possible for Ireland to measure its environmental progress, in particular to measure its performance with reference to the commitment it has made towards sustainable development[14].

Lack of information provision, education and training

It is not enough to gather information through research and studies. This information must also be presented in a variety of suitable forms that can be easily assimilated and disseminated widely and effectively to relevant target groups.

Many industrial and commercial producers of waste complain about the lack of information available on how they could reduce their waste arisings, how they could reuse their waste streams, what kind of legislative requirements have been imposed on them etc. Many members of the general public complain about the lack of information regarding their options for waste prevention and minimisation. Many local authorities are unsure of the best methods of changing environmental attitudes, increasing awareness levels, approaching the general public on environmental issues, what type of information is needed by SMEs etc.

Thus there is a general lack of information dissemination regarding waste prevention in Ireland today. While there are some sources of information available, e.g. ENFO, REPAK, Enterprise Ireland etc., these are not adequate to fully serve the needs of those in search of detailed and specific information on waste reduction and its benefits. There is no single visible focal point for quality information on waste in Ireland. The proposed National Waste Prevention Plan does make provision for overcoming this barrier: "Creating awareness of the benefits of waste prevention and minimisation initiatives is a key element in promoting sustainable processes and products. Part of the Core Prevention Team's remit will be to ensure that business is made aware of the advantages of participating in the Programme." (DoELG, 2002b).

This information deficit is especially apparent in SMEs and local authorities are not playing an adequate role in targeting this group. The lack of knowledge and apathy prevalent in many SMEs is noted in Section 3 and was identified by a survey carried out in the development of the *Connaught Waste Management Plan*. The same problems were accepted in other waste management plans. Thus there is an urgent need to educate and train the staff of industrial, commercial and retail waste producers on a broad scale regarding waste prevention methods and guidelines. It is especially important to inform businesses of their legal commitments and how to develop greener and more informed purchasing policies in order to prevent waste at source.

Lack of green public procurement

There is currently a distinct lack of green procurement policies in the commercial, industrial, and domestic sectors in Ireland. However, in order to reduce non-essential resource depletion and hence waste, such policies are also urgently required in the public sector.

It is estimated that public procurement purchases are valued at over €1,000 billion every year across the EU (14% of EU GDP) (CEC, 2001a). In Ireland the Gross Domestic Product for 1999 (CSO, 2002) was IR£69 billion, 14% of which is IR£9.7 billion (€12.3 billion). This

[14] as stated in: DoE, 1997

adds up to considerable spending power, leading to a large consumption of raw materials and consequent waste generation. However, green public procurement policies are not yet being widely implemented in Ireland.

The European Commission has recently adopted a Communication (CEC, 2001a) that defines the legally correct way for public authorities to take environmental considerations into account when making purchasing decisions without infringing internal market or other public procurement rules. For example, public authorities can specify the raw materials and the production processes used in a contract. They can require energy from renewable sources or less material intensive products. However, in Ireland they are reluctant to do so, despite examples from other countries where this has occurred. Thus there are clear legal procedures in place whereby hospitals, schools, universities, colleges, health boards, local authorities, government offices etc. can significantly pursue less material intensive purchasing procedures. But they are not being used, either because of a lack of awareness or due to a conservative interpretation of the competition rules related to tender evaluation.

Lack of economic instruments

Some economic instruments with waste prevention and reduction potential that are already being implemented in Ireland have been identified and described in Section 3. These include the plastic shopping bag levy, the landfill levy, landfill charges, and use related waste charges. REPAK charges may also have some potential to minimise waste from packaging.

The two levies and increased landfill charges are being implemented on a wide scale and can have great effect – this should be measured. However, the use-related charges required in the household sector are not, as yet, being applied widely. This is required in order to reduce household waste arisings and is recommended by the most recent national waste policy: "As a matter of equity, and to directly incentivise waste prevention/minimisation and recycling, the level of waste charges imposed on households and businesses, either directly or through gate fees, should be based on usage. Accordingly, the Government expects that all local authorities will move towards introducing weight/volume related charging to the fullest extent possible within the next three years." (DoELG, 2002b)

Other economic instruments are also required to implement the polluter pays principle and to ensure extended producer responsibility. These can apply generally or to specific material steams, such as newsprint, PET bottles, disposable items, single use packaging etc.

Economic instruments can also be used as incentives and the *Waste Management (Amendment) Act 2001* has set up an Environment Fund that, it is hoped, will be used to support specific preventive initiatives. One such commitment in *Delivering Change* was the provision of seed funding of €1.27 million in 2002, to facilitate the immediate establishment of the Core Prevention Team and provide ongoing support for the Team[15]. However it is important that this fund will not be used *instead of* previously committed available funding but to supplement it.

Legislative deficiencies

Environmental legislation can have a major role in changing behaviour. *The EPA Act, 1992* has had a significant impact on certain sectors of industry and how they perform regarding the environment. The EPA Act has been implemented in such as way that the subsequent Integrated Pollution Control (IPC) licensing system focuses on waste prevention, cleaner production and BATNEEC (best available technology not entailing excessive cost).

[15] This did not occur in the year 2002

The Waste Management Act, 1996, The Waste (Packaging) Regulations, 1997, Waste Management (Packaging) (Amendment) Regulations 1998 and the *Waste Management (Amendment) Act, 2001,* have attempted to tackle the issue of solid waste production and are also now having an effect, especially in the area of improved arrangements for waste disposal and recovery management, through better permitting systems.

A recent and very effective legislative method of forcing commercial waste producers to increase their levels of recycling and look at possible waste reductions is the banning of commercial waste in landfills. The banning of certain waste streams that are particularly recoverable (e.g. cardboard, paper, glass) has been used in several regions. Likewise the banning of very large waste streams such as those from Construction and Demolition (C&D) waste. Recently, however, in areas where landfill space has become scarce (such as Galway and Cork), the banning of all or a high percentage of commercial waste has been implemented. The *Waste Management (Amendment) Act, 2000* (Section 8) also allows the Minister to prohibit or limit the landfill of specified waste streams at a national level.

However, with much of this legislation, the focus in on what to do (or not to do) with waste after it has arisen. A greater focus is required on ways to legislate for waste producers to prevent this waste at source. *The Waste Management (Packaging) (Amendment) Regulations 1998,* for example, attempts to consider ways to minimise the packaging that producers are putting on the market. Other such regulations for other material streams should also be considered.

Lack of enforcement

However, it is not enough to enact such legislation. It is also required that it be enforced. There is evidence that many waste producers are not aware of their obligations under waste management legislation. There is further evidence that there is widespread non-compliance with several aspects of the legislation by producers. It is vital that all such legislation be enforced.

The situation regarding enforcement has been alleviated somewhat by the setting up of a network of enforcement officers, co-ordinated by the Department of the Environment and Local Government, in 8 Dublin city and county councils. This network aims to ensure that a systematic approach is taken by the local authorities involved and it is hope that the network will be expanded to include all local authorities by the end of 2002.

Another welcome development is the government commitment in policy statement: *Preventing and Recycling Waste – delivering change* to set up a producer responsibility unit in the EPA: "The Government will establish a Unit within the EPA to co-ordinate and secure better enforcement of producer responsibility initiatives. This unit will build on the Packaging Regulations enforcement network which has already been established by the Department of the Environment and Local Government. While better enforcement will be its primary function, the Unit will also have a specific brief covering information collection and reporting, research, provision of guidance and assistance and promotion of best practice" (DoELG, 2002b). The government has also committed to making funding available from the Environment Fund to strengthen local authority enforcement and consideration is being given to strengthening the enforcement provisions of the Waste Management Acts. Local authorities in particular must be provided with aid to improve their performance regarding enforcement of the regulations.

Lack of extended producer responsibility (EPR)

Extended producer responsibility means that the responsibility of producers for their products is extended to the pre-manufacturing and post-consumer stages and includes the full

environmental impact of the life-cycle of the product or packaging. Products have an environmental impact at all stages of their life cycle as discussed above. However, while some companies take responsibility for the environmental impact at production levels (e.g. through IPC Licensing, environmental management systems etc.) and regarding recovery (e.g. through REPAK), they are not tackling the problems related to the resource acquisition, sales, transportation and usage of their products.

Furthermore, while schemes such as REPAK make some impact on EPR regarding some packaging products, this is not extended to many other non-packaging products. It is hoped that new programmes will be set up to tackle other waste streams such as waste electrical and electronic equipment (WEEE) and end of life vehicles (ELVs) to meet the requirements of EU Directives. Another voluntary scheme to deal with construction and demolition (C&D) waste is also described in Section 3.2.4 of this report. However there are many other waste steams for which little or no EPR is being applied in Ireland. Furthermore, such programmes should not only examine ways to recover the waste from all these streams, but also ways to prevent these wastes from arising in the first place.

Design for disposal

In order to achieve sustainability is it envisaged that we will have to, at the least, achieve between 'factor 4' and 'factor 10' levels of resource and energy reduction. This will only happen if a major shift in thinking how we design and use our products and services takes place. It will require fundamental changes in lifestyle and significant moves away from resources towards services.

In Ireland at present, most products are designed for single usage and then disposal. Some companies are now making the first breakthrough whereby they are looking at designing with a view to later disassembly and reusing or recycling some components. However neither of these approaches will come close to achieving sustainability. Furthermore, those are the leading companies – the vast majority of producers, and virtually all SMEs have almost no information or understanding regarding the issue of eco-design.

One Enterprise Ireland programme to support environmentally superior products is described in Section 3.2.2, and this has led to about 30 companies in Ireland receiving funding for more sustainable design investigation and implementation since 1999. That is just a beginning, but if we are to move towards sustainability through dematerialisation, all producers will have to make a radical change in thinking. Nothing less than a major re-evaluation by businesses and consumers in how and why they consume materials is required.

Lack of business champions

Only very few companies have the foresight to realise that in the long term, commercial viability and environmental sustainability are co-dependent. Most companies take a short-term approach and look upon issues such as resource usage, energy usage, waste and emission issues as necessary evils to be dealt with in an ad-hoc or crisis management manner. These companies do what they have to in order to meet regulatory compliance (where regulations are being enforced), or economic pressures, but it is extremely difficult for them to see the long term value of spending resources on waste reduction as well as regulatory compliance. However, the emerging trend whereby some companies are demanding that their suppliers demonstrate environmental responsibility has the potential to bring improvements – and this should be supported.

At all levels of society, it is apparent that there is a lack of appreciation of the long-term economic benefits of sustainable production and consumption, because our accounting systems do not factor in total environmental costs. At national levels, the problems

associated with long term waste and emissions and resource depletion are not factored in financial estimates, therefore they do not receive the emphasis that is, in reality, required.

A major barrier to the promotion of waste prevention relates to the large waste management industry in Ireland. This is described above and now several multi-national and very large organisations are active in waste disposal at present, employing thousands of people and with multi-million Euro turnovers. Some of these are now also concentrating on incineration and recycling and are developing infrastructure and skills to meet future demands. In effect, they are championing these options and educating waste producers and handlers (from industry, commerce and local authorities) as to the various opportunities available.

Waste disposal (landfill or incineration) and waste recovery, if handled properly and with good pricing, can be lucrative for the waste management sector. But this is not true of waste prevention. Contractors usually charge by the volume or weight of waste collected for recycling or disposal. If these volumes decrease, then the demand for and the profits of these companies decrease. Thus a major champion of incineration and recycling will not support programmes or policies that reduce waste arisings. This makes the prevention option more difficult to "sell" to waste producers.

4.5 Summary of barriers to prevention

In all, 19 barriers to prevention are identified here, which, combined, require major driving forces to overcome. The main two barriers are, without doubt, the lack of priority and resources and the inadequate administrative systems to kick start any process of change. Only when these two obstacles are overcome can the other social, economic and information-based barriers be tackled.

Some of the barriers are social and while they may not be easily overcome, their effects can possible be ameliorated by the instruments recommended in Section 6.4. Others are information based and these are not surprising since prevention is a relatively new topic, especially in Ireland, and society has just begun to find ways of dealing with them.

Others related to a lack of economic and legislative support – both of which again require resources and commitment.

Table 4.3 lists the 19 barriers identified.

Table 4.3. Barriers to waste prevention in Ireland

Barriers to Waste Prevention in Ireland		
Lack of Priority and Resources	Lack of Administrative System	
The Throwaway Society	The Convenience Society	Social/Demographic Changes
Cheap and Easy Disposal	Infrastructural Deficiencies	Lack of Research
Low Awareness Levels	Lack of Materials Flow Data	Lack of Information Provision, Education and Training
Lack of Waste Data	Lack of Economic Instruments	Legislation Deficiencies
Lack of Green Public Procurement	Lack of Extended Producer Responsibility (EPR)	Design for Disposal
Lack of Enforcement	Lack of Business Champions	

5. Waste Prevention Measures Worldwide

Several waste prevention policies, plans, strategies and programmes have been initiated worldwide at national, regional and local levels. Such actions are considered a prerequisite for sustainable development in those regions. Some of these activities are at an early stage and while they can be described and analysed, definitive results are not yet available. However, others have either been completed, or have been underway for some time and results are available. Where possible the latter schemes are discussed in more detail. A fuller description of these measures is given in Appendix II and they are summarised below. While it is fair to say that in many regions attempts at prevention (if taken at all) have generally been unsuccessful, in others some success has been achieved.

In choosing suitable programmes and measures that may be applicable to Ireland, it was considered best to focus on countries and regions that may be similar to Ireland in size, population, economic status and in other ways. Thus countries such as the Netherlands, Austria, Denmark, Belgium etc. are potentially more applicable to an Irish context than, for example USA, Germany, or Japan.

In the case of Belgium, waste management planning and implementation is done at a regional level, therefore it was considered useful to examine the measures and instruments which have been successfully implemented in one region: Flanders.

Finally, a comparison of the implementation of the waste prevention policies and measures in 21 countries is also made in Appendix II, based on work carried out in 1996 – 1998 by the OECD. The OECD has been active in the field of waste minimisation and waste prevention for several years. Working Groups have been developed and several workshops have taken place with a view to harmonising waste prevention and developing best practice tools and instruments applicable to all OECD Member states.

5.1 Netherlands

The main foundations for the present Dutch policies on waste were set down in the period 1988 – 1991 (Ministry of Housing, Spatial Planning and the Environment, The Netherlands, 2001a) when some seminal developments occurred including:

- Memorandum on Prevention and Reuse of Waste.
- Introduction of producer responsibility.
- Development of Waste Consultation Body.
- Signing of Packaging Covenant between authorities and producers.

10-year programmes for non-hazardous waste and multiannual plans on hazardous waste supplemented those programmes during that period. The current plan, *Waste Management Plan 2002 – 2012,* is now being developed and is in draft format.

The programmes and tools implemented since 1998 have provided some success in The Netherlands, in particular they led to major decreases in landfilling and increases in recycling as can be seen from Figure 5.1:

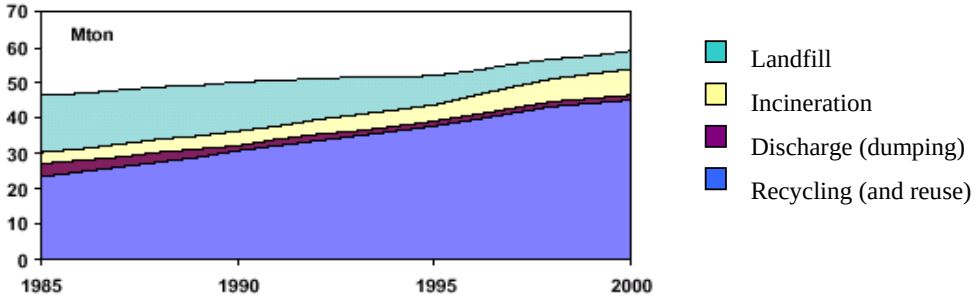

Figure 5.1. Waste management in The Netherlands, 1985 – 2000 (Ministry of Housing, Spatial Planning and the Environment, The Netherlands, 2002)

The overall annual volumes of waste arising grew over that 15-year period from 46 million tonnes to 57 million tonnes, an increase of 24%. However, in that time the GDP of The Netherlands rose by 54%. Thus *The National Waste Management Plan* achieved a decoupling of waste arisings and GDP over the period 1985 – 2000 as Figure 5.2 shows. If arisings had matched GDP (54%), an extra 14 million tonnes or 71 million tonnes in all would have arisen, therefore it could be calculated that a prevention rate of 14/71 or 19% was achieved (Ministry of Housing, Spatial Planning and the Environment, The Netherlands, 2002).

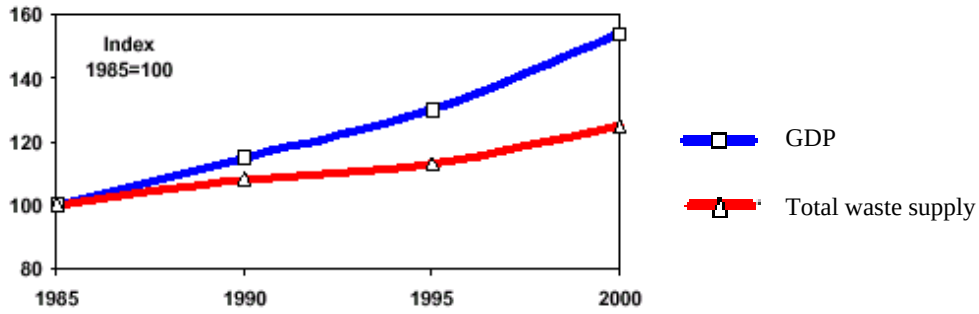

Figure 5.2. Waste arisings and GDP in the Netherlands, 1985 - 2000

While there was some success for overall waste arisings, an equivalent decoupling in household waste is not so apparent. The growth of domestic waste from 1985 – 2000 in the Netherlands has been greater than GDP, as Figure 5.3 shows.

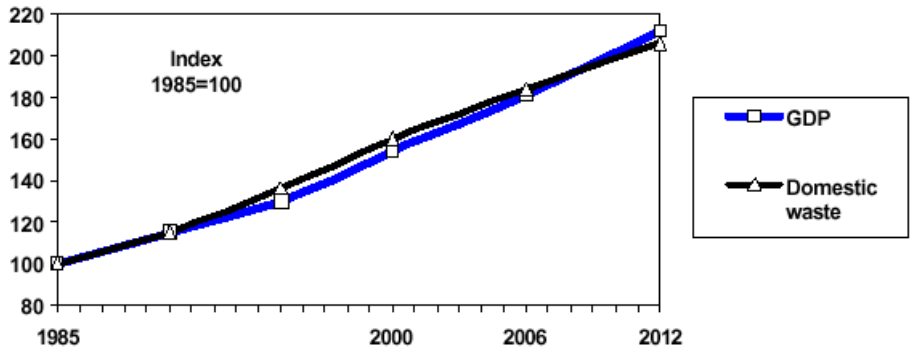

Figure 5.3. Domestic waste and GDP in the Netherlands 1985 - 2012

This is problematic since residual domestic waste constituted almost 40% of disposed waste over that period. The *Waste Management Plan 2002 – 2012* aims to reverse that trend, as the future projection in Figure 5.3 shows, and it focuses particularly on domestic consumer practices and trends.

For another major stream: trade, services and government, the waste between 1995 (when reliable data became available) and 2000 was slightly disconnected from GDP as indicated in Figure 5.4. The prevention policies in the *Waste Management Plan 2002 – 2012* aim to significantly increase this relative disconnection with specific tools and instruments aimed at this sector. Since it is estimated that 50% of waste produced in businesses and institutions comes from companies with 50 or more employees, the policies are aimed particularly at (retail) trade chains, larger offices and care institutions. The plan also specifically targets the public sector, especially with respect to procurement. For example, a target has been set for government organisations to reduce their use of paper by at least 35% over those 10 years.

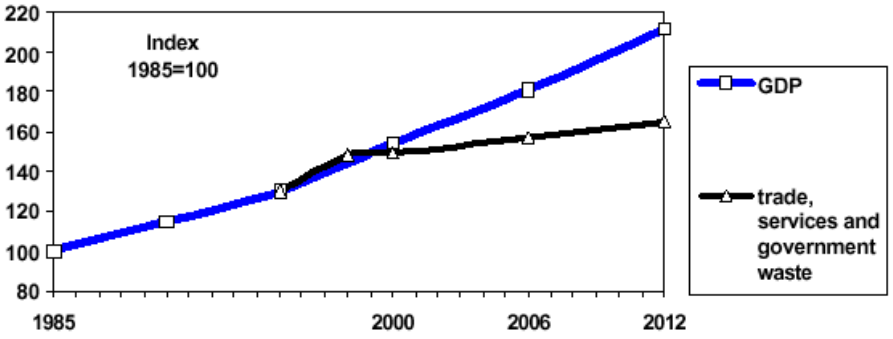

Figure 5.4. Trade, services and government waste and GDP in the Netherlands 1985 - 2012

A major success of recent policies and programmes in The Netherlands, especially from an Irish perspective, was its reduction in landfill dependency, especially in comparison to the growth in GDP. A reduction in landfill was one of the main objectives of the waste management plan during the 1980s and 1990s, since that is one of the least desired methods of waste management (and space is a scarce commodity in the region). Between 1985 and 2000 in The Netherlands, the amount of waste landfilled fell from 16 million tonnes to about 5 million tonnes per annum despite the rise in GDP of 54% mentioned above. This absolute decoupling of GDP and landfilling dependence is shown in Figure 5.5.

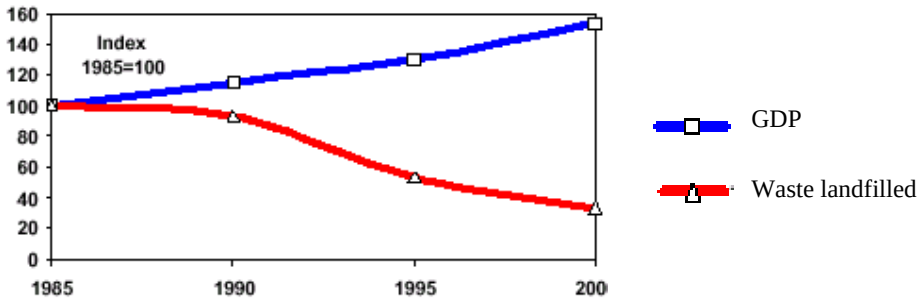

Figure 5.5. GDP and waste landfilled in the Netherlands, 1985 - 2000

In addition to that quantitative reduction in prevention, the attitudes and perceptions regarding waste production are also a good indicator of future progress. It is clear that once businesses and institutions become aware of and interested in waste prevention, the possibility of actual waste prevention becomes greater. Regular studies in The Netherlands over the periods 1995–1997 and 1997–1999 measured five stages of interest in and awareness of waste prevention: non-interest; interest; initiation; implementation and routine.

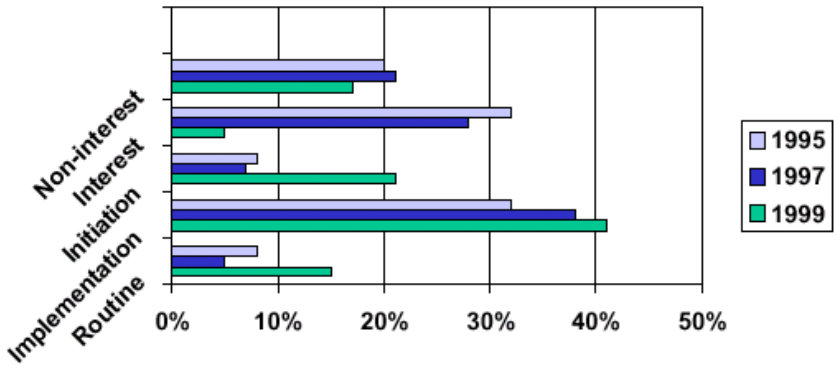

Figure 5.6. Interest of businesses in waste prevention, 1995, 1997 and 1999

Figure 5.6 shows that between 1997 and 1999 there were improvements regarding prevention-related attitudes and behaviour, compared with the 1995 – 1997 period. The number of non-interested businesses and institutions remained roughly the same. In the other phases there were improvements in attitudes, from which it can be concluded that many businesses and institutions moved from the initiation phase and the implementation phase to making prevention routine. By 1999, approximately 75% of the businesses and institutions were actively involved in prevention, i.e. at the initiation, implementation and routinisation phase. Approx. 55% of the businesses and institutions were at the implementation and routinisation phase, which means that that they are introducing, or have introduced, prevention.

Almost all industrial sectors have recorded progress between 1997 and 1999. The most striking improvements were in abattoirs (from 36% to 92%), woodworking businesses (from 30% to 83%), chemical businesses (from 58% to 92%), and metalworking and electrical businesses (from 48% to 78%) (Ministry of Housing, Spatial Planning and the Environment, The Netherlands, 2002).

The main instruments of the *Waste Management Plan 2002 – 2012* may be divided into those relating to communication/information, economics and regulations. They include:

Communication/Information

- awareness raising programmes, especially for consumers and SMEs
- programmes to create a knowledge base and also to support injunctions, regulations, bans, collection schemes etc.
- technical support schemes for industry
- market development programmes for recyclable materials
- green public procurement.

Economic

- environment based taxes
- producer responsibility
- rate differentiated domestic waste charges
- landfill and incineration taxes
- producer responsibility programmes
- financial supports and grants for infrastructural improvements
- economic rewards for good behaviour – exemption from taxes etc.

Regulatory

- injunctions and bans
- self regulation – covenants and voluntary agreements.

It is clear that the *Waste Management Plan 2002 – 2012* aims to implement a series of instruments based upon communication/information, economic and regulatory supports for waste prevention. It is also planned to focus special attention to domestic and trade, services and government-sourced waste as well as streams with high prevention potential. An integrated approach is planned which also encompasses energy and water based programmes.

5.2 Denmark

Waste 21, The Danish National Waste Management Plan (DEPA, 1999c) covers waste management in Denmark in the years 1998 - 2004. The waste management plan is a follow-up of the Danish Government's Report on Waste, presented in early 1998. *Waste 21* set the agenda for near-future waste management in Denmark. The plan gives a description of present waste management, initiatives already implemented, as well as new initiatives that aim to ensure better and more efficient waste management. The actions planned in *Waste 21* are also designed to be a signal to local councils of measures to be taken in the coming years which will be considered in the next generation of municipal waste management plans. *Waste 21* aims to meets the requirements of EU legislation with respect to waste management plans, which must be drawn up by all Member States.

Waste 21 for the most part concentrates on intensified recycling and higher quality in waste treatment, but the Danish government has also decided to focus attention on waste prevention and to launch initiatives in that area. Against this backdrop, a discussion paper on waste prevention in Denmark was prepared as a basis for setting up a suitable strategy.

In the discussion paper, the overall objectives for the waste-prevention strategy are to stabilise the total volume of waste in 2004 and to reduce it in a longer perspective.

The goals are to foster the production, marketing and consumption of products that generate less waste throughout their product life cycles, to promote services limiting the use of materials and to engender a shift in attitudes and behaviour that leads to reduced waste generation.

The discussion paper underlines that the instruments proposed should create incentives for the various players that generate waste: consumers, service suppliers, manufacturing companies and the construction industry.

The instruments of the product-orientated environmental initiative are pivotal to waste prevention. But it is also important to ensure that the waste-prevention strategy intensifies the existing waste prevention in these instruments without triggering a corresponding increase in another type of environmental load (e.g. consumption of hazardous chemical substances, heightened generation of greenhouse gases, etc.).

Waste arisings in Denmark from 1994 to 1996 show a relatively considerable growth, however this trend has stabilised somewhat in recent years. Figure 5.7 indicates an overall increase in total annual arisings from 11.1 million tonnes in 1994 to 13 million tonnes in the year 2000 (or 17% over 6 years). However, the arisings between 1996 and 2000 were almost static (0.92% over 4 years).

For households, the annual waste amounts grew from 2.57 million tonnes in 1994 to 3 million tonnes in the year 2000. This indicates a growth rate of 19.7% over 6 years. The waste arising from institutions/trade and offices has shown considerable growth over that period, from 0.6 million tonnes in 1994 to 1.1 million tonnes in year 2000 (a growth of 70% over six years).

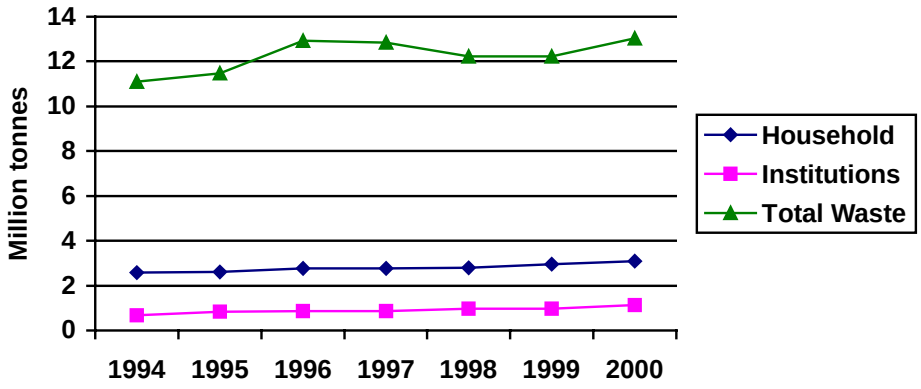

Figure 5.7. Waste arisings in Denmark, 1994 – 2000

These growths in arisings indicate that the main focus on waste plans in that period was on higher recovery levels and a move away from landfill. However, now Denmark also aims to reduce growth levels in arisings in order to "stabilise the total volume of waste in 2004 and to reduce it the long term". In general, the goals of Denmark are to foster the production, marketing and consumption of products that generate less waste throughout their life cycle; to promote services limiting the use of materials and to engender a shift in attitudes and behaviour that leads to reduced waste generation.

Again, the main instruments planned in Denmark are those relating to communication/information, economic and regulatory. They are discussed in detail in Appendix II and include:

Communication/Information

- accumulation of knowledge and competence through research
- information provision on the objectives of the Waste Management Plan
- competence building among key stakeholders through training
- use of life-cycle assessment methods, data and tools
- use of green accounts, environmental guidelines and manuals
- use of eco-labels and environmental product declarations
- green guides (environmental consultants in communities)
- green public procurement policies and green private purchasing.

Economic

- green taxes and charges including:
    - product taxes and charges
    - tax differentiation
    - effluent taxes and charges
    - user fees
    - administration charges
- subsidies such as:
    - grants
    - soft loans
    - tax allowances
- deposit-refund schemes for:
    - reusable items
    - disposals.

Regulatory

- regulating products (e.g. chemicals in products)
- industrial permits etc.
- enforced segregation
- deconstruction of buildings (not demolition)
- landfill bans

5.3 Austria

In 1996, The Austrian Federal Government *National Environmental Plan (*Austrian Federal Ministry of Environment, Youth and Family Affairs, 1996) set out many of the principles, issues, goals and measures required in Austria for sustainable production and consumption of raw materials as well as waste management.

In that document a crucial core connection is made between wastes and raw materials: "Wastes and raw materials are interconnected via the production and consumption process and cannot be viewed independently: waste and resource problems must be solved jointly."

The *National Federal Waste Management Plan* of 2001 (Austrian Federal Ministry of Agriculture and Forestry Environment and Water Management, 2001) further develops some

of the principles upon which Austria bases its policies and strategies: “In waste management, the successful implementation of sustainable principles increasingly requires that the consumption of materials is taken into account in its entirety, and material management should be based on ecological as well as on economic aspects.

“Goods production is for the most part dependent on the continuous exploitation of raw materials. Both the enormous consumption of fossil energy resources and the quantities of mineral raw materials exploited continue to present an upward tendency. The massive consumption of materials to meet the demands of the economy results in ever-increasing quantities of waste and pollutants.

“This development can be remedied by reduced material consumption on the one hand and increased implementation of a cyclic economy on the other hand, which provides for the options of re-use and recovery already during the production stage and, thus, helps to avoid pollutants. In this context, material flow management exerts a targeted influence on the use of materials.

“Material flow management always presupposes knowledge of the relevant flows of materials in order to be able to intervene into the system at the appropriate points. This creates considerable advantages, above all for sustainable industrial/commercial production.”

These principles are enshrined in Austrian law by the *Waste Management Act (AWG) 1990* whereby three of the four main objectives of that Act (as amended) are defined through materials, not only through quantities of materials but also material loads. The ecological management of material flows requires the long-term control of flows of anthropogenic materials which reducing environmental pollution to a minimum.

Under the Austrian waste management strategy, special emphasis is placed on the responsibility of the manufacturer. The principle of producer responsibility is therefore reflected in the measures recommended (see Appendix II) while also taking into account the responsibility of other actors involved in the economic process.

The objectives of the *Waste Management Act* are:

1. Harmful, detrimental or other effects hazardous to the general well-being of humans as well as animals, vegetation, their basis of life and their natural environment must be kept to an absolute minimum.
2. Conservation of raw material and energy resources.
3. Lowest possible exploitation of landfill volume.
4. Substances should only be left as waste if their disposal does not constitute any hazard potential for future generations (precautionary principle).

Table 5.1 show the waste arisings in 1999 for Austria.

Table 5.1. Total waste generation for Austria, 1999

Total Waste Generation	Million Tonnes
Hazardous waste and waste oils	1.0
Waste from households and similar institutions	3.1
Excavation material (soil) from construction	20
C&D waste	7.5
Waste of mineral origin excluding C&D waste	4.1
Waste from wood processing excluding pack.	3.8
Waste from water purification, sewage etc.	2.3
Secondary materials industry/commerce	2.2
All other non-hazardous waste	4.6
Total	**48.6**

The Austrian Federal Government *National Environmental Plan* lays out three general measures for resource/raw materials and waste management:

1. material balances
2. improved utilisation and disposal
3. design products, processes and systems based on criteria of regional material balances, optimal use of raw materials, and long-term environmental compatibility

Specific measures and instruments from *Federal waste management plan 2001* include measures relating to Communication/Information, Economic and Regulation as follows:

Communication/Information

- sector specific guidelines
- information and public awareness campaigns
- training of and actions by eco-consultants and waste-consultants
- green public procurement
- research.

Economic

- environmental grants and subsidies
- economic supports for research.

Regulatory

- legislative support for green public procurement
- requirement of companies to appoint waste officers and develop waste management plans
- EMAS Regulation
- voluntary agreements for old tyres, PVC products, packaging and ELVs

- regulations on demolition waste and excavated soil; packaging; WEEE; biogenous wastes.

5.4 Flanders

In Belgium, waste prevention programmes are developed regionally. Flanders, Wallonia and Brussels have adopted waste management regulations in conformance with EU policies. For the purposes of this report, the policies and measures applied in Flanders will be considered.

In Flanders the *Flemish Regulations on Waste Prevention and Management (VLAREA)* have established the implementation of waste management in the region. VLAREA clusters the implementing orders of the Waste Decree. These regulations cover requirements for both industrial and domestic waste.

OVAM (the Flemish Public Waste Agency) was founded by the waste decree of July 2nd 1981 and launched a series of initiatives during the eighties in order to put the Flemish waste policy in line with sustainability principles and EU requirements. OVAM measures are, for the most part, sector based implementation plans for specific projects, prevention-oriented actions, recovery and waste disposal or to specific waste categories. For the development of sector-based plans OVAM involves the various government bodies, institutions and private organisations most concerned.

The provisions of these sectoral implementation plans apply to the administrative governments of the Flemish district, the provinces, municipalities and public or private institutions responsible for public welfare tasks with regard to environmental policy, except if explicitly otherwise stipulated. In that respect they are merely indicative.

The objective of the first *Waste Plan for Flanders* (period 1986-1990) was 'to produce order out of chaos'. This included the closedown and sanitation of dumping grounds, the optimal use of incineration capacity and the development of collection systems for separated household waste. Although this plan was primarily concerned with waste disposal, steps were also taken towards waste recycling.

The next *Waste Plan* (period 1991-1995) started from the results obtained by the first plan and went further by shifting the attention from waste recycling to waste prevention. The separated collection of household waste was intensified and the necessary supporting policy instruments and infrastructure were developed. Unlike the first plan, the second *Waste Plan* clearly focused on prevention and recycling.

Since 1994, policy planning within OVAM has been implemented through sectoral implementation plans. Also the *Implementation Plan for Household Waste* (period 1997-2001) was based on the results of the previous *Waste Plans*. It further promoted the separated collection of household waste and set very precise and concrete goals with regard to household waste prevention and recovery. The plan's objectives (using 1995 as a baseline) included:

- Waste reduction targets of 6% by 2001 and of 10% by 2006.
- Recycling rates of 52% by 2001 and 55% by 2006.
- Each municipality must generate less than 150 kg/inhabitant/year of residual waste by 2006.

All these initiatives, with actions via the comprehensive mix of instruments outlined below, have been very successful. In 1999, Flanders region achieved a separate collection (recycling) rate of 58%, which means that compliance with the initial objective for 2006 has already been attained.

During the period 1991 to 1998 the residual waste fraction decreased from 318 to 217 kg/inhabitant/year, while selective collection of recyclables increased from 74 to 310 kg/inhabitant/year (OVAM, 1999a). This has been the result of straightforward planning, with a good mix of instruments (regulations, agreements, initiatives and taxes applied by regional and local authorities).

Currently a new *Implementation Plan for Household Waste* is being developed for 2003-2007. This plan will also start from an evaluation of the results of the previous *Implementation Plan for Household Waste*. It consolidates the obtained results and ensures their continuation. Moreover, an implementation acceleration and intensification is proposed and an optimal instrument mix will be developed to achieve the objectives. For the new planning period, specific qualitative and quantitative objectives will be formulated and achieved through specific campaigns. These will be launched in all domains (from prevention up to and including disposal). The ultimate goal is to limit the effects on the environment as much as possible.

The Flemish waste arisings are shown in Figure 5.8 (OVAM, 2001a). From this it can be seen that while annual amounts of municipal waste have increased from 1992 to 1999, the growth rate is extremely slow, as are the growth rates for total waste and other sectors[16].

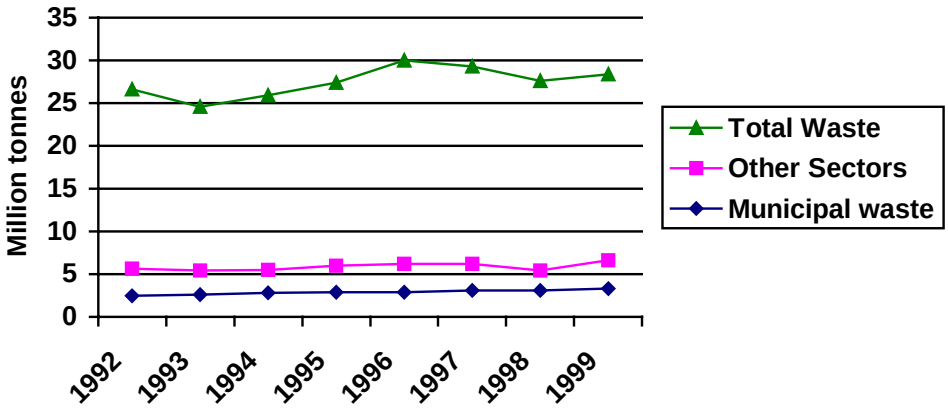

Figure 5.8. Waste arisings in Flanders from 1992 – 1999

Since this rate of growth is so small, it may be stated that the Flemish have been successful in decoupling their economic growth from their waste arisings. Figure 5.9 shows another feature of recent Flemish waste management, i.e. the improvement in the management of waste that has arisen, whereby dependency on landfill has decreased from 43% in 1991 to 16% in 1999; use of incineration has decreased from 36% in 1991 to 22% in 1999; and recycling rates have grown from 21% in 1991 to 62% in 1999. Thus Flanders is moving up the waste management hierarchy towards prevention. The recycling targets of 51% for the year 2001 and 57% for the year 2006 were both met in 1998.

[16] Other sectors include: medical care, laundry services, transport, telecommunications, supermarkets, railways, cleaning, recreation, aviation, wholesale business, and garages.

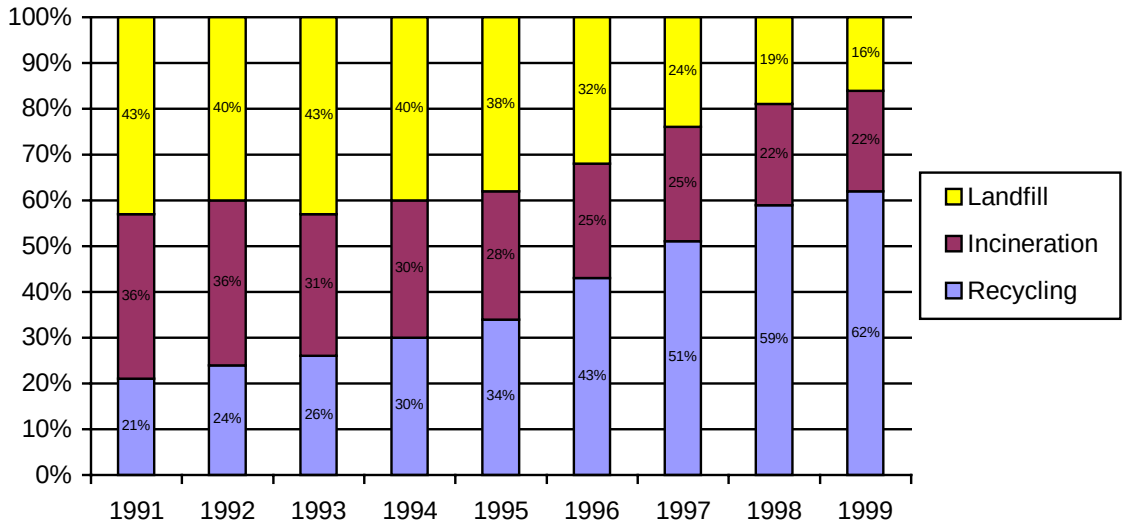

Figure 5.9. Waste management in Flanders, 1991 - 1999

A wide range of instruments have been applied in Flanders to meet these targets including a series of sector-based implementation plans, for the construction and demolition waste sector, for biological waste, for household refuse, for separated collection of waste from small to medium sized enterprises, and other sectors. These are described in more detail in Appendix II.

Specific instruments relating to communication/information, economics and regulations applied include:

Information/Communication:

- widespread series of research campaigns
- advice and consultancy centres for business and government
- series of guidelines documents for industry
- local authority campaigns to support measures
- eco teams
- compost promotion campaigns
- campaigns in schools.

Economic

- differential charging for household waste
- landfill charges and taxes
- incineration charges and taxes
- national government subsidies to local government (performance related and based upon covenants)
- grants schemes to business organisations – PRESTI Programmes
- grants to individual companies for raw material and energy savings.

Regulatory

- mandatory separation of household and commercial waste – collection by authorities

- take back or duty of acceptance for certain waste streams – agreements
- environmental covenants between central government and municipalities
- landfill bans for specific streams
- stricter incineration standards.

5.5 Summary

From the summaries above and the more detailed description in Appendix II, it can be seen that preventive-based policies have been in place in these four regions, for some time, which indicate that attempts are being made to decouple waste from economic growth. The societies in those regions have then showed their commitment to their policies by implementing several well-resourced strategic raw material/waste management and prevention strategies and plans. These plans have been supported by specific and focused administrative structures and dedicated agencies, for example OVAM was set up in Flanders in 1981. Thus the successes apparent in those regions have taken considerable commitment, time, resources and effort. By contrast, in Ireland, regional waste management plans have only been begun by 2001 and as yet there is still no dedicated group, agency or agencies in place to manage waste issues and co-ordinate efforts for waste prevention.

A wide and varied mix of instruments have been or are being applied in these four regions for some time, to good effect. Each of these tools and instruments can be broadly categorised as being based upon a communication/information, economic and/or regulatory basis, though some overlap does occur. Table 5.2 shows that The Netherlands, Denmark, Austria and Flanders have all applied instruments from each category, but the mixture or emphasis tends to vary from region to region. For example, there is an emphasis in the Netherlands and Flanders on covenants and agreements, but Denmark has used economic instruments, especially taxes, more widely. The importance of information and communication in Austria can be seen from the number of consultants employed and the amount of training being carried out, and company-based legislation is also prominent in that country.

It can also be seen from Section 3 that some of these instruments are also now being applied in Ireland but to a much lesser extent and only quite recently. For example, the local and national awareness campaigns are less extensive in Ireland, the range of economic instruments is not as wide, nor is the legislation being implemented as well as elsewhere. This is also reflected in the recommendations regarding the required framework in Section 6.

Table 5.2. Main instruments and tools being used in four regions considered

REGIONS	INSTRUMENTS		
	Communication/Information	**Economic**	**Regulatory**
Netherlands	– Awareness raising programmes, especially for consumers and SMEs – Programmes to create a knowledge base and also to support injunctions, regulations, bans, collection schemes etc. – Technical support schemes for industry – Market development programmes for recyclable materials – Green public procurement	– Environmental based taxes – Producer responsibility – Rate differentiated domestic waste charges – Landfill and incineration taxes – Producer responsibility programmes – Financial supports and grants for infrastructural improvements – Economic rewards for good behaviour – exemption from taxes etc.	– Injunctions and bans – Self regulation – covenants and voluntary agreements

Denmark	– Research
	– Information provision on the objectives of the Waste Management Plan
	– Training of key stakeholders
	– Life-cycle assessment tools
	– Green accounts, guidelines & manuals
	– Eco-labels and product declarations
	– Green guides (environmental consultants in communities)
	– Green public & private procurement policies
		– Green taxes and charges including
		  – Product taxes and charges, tax differentiation, effluent taxes and charges, user fees, administration charges
		– Subsidies
		  – Grants, soft loans, tax allowances
		– Deposit-refund schemes
		  – Reusable items, disposals
			– Regulating products (e.g. chemicals in products)
			– Industrial Permits etc.
			– Enforced Segregation
			– Deconstruction of buildings (not demolition)
			– Landfill bans

Austria	– Sector Specific Guidelines – Information and Public awareness campaigns – Training of and actions by Eco-consultants and waste-consultants – Green public procurement – Research	– Environmental grants and subsidies – Economic supports for research	– Legislative support for green public procurement – Requirement of companies to appoint waste officers and develop waste management plans – EMAS Regulation – Voluntary agreements for old tyres, PVC products, packaging and ELVs – Regulations on demolition waste and excavated soil; packaging; WEEE; biogenous wasted
Flanders	– Widespread series of research campaigns – Advice and consultancy centres for business and government – Series of guidelines documents for industry – Local authority campaigns to support measures – Eco teams – Campaigns in schools	– Differential charging for household waste – Landfill charges and taxes – Incineration charges and taxes – National government subsidies to local government – Grants schemes to business organisations – Grants to individual companies	– Mandatory separation of household and commercial waste – collection by authorities – Take back or duty of acceptance for certain waste streams – agreements – Environmental covenants between central government and municipalities – Landfill bans for specific streams – Stricter incineration standards

Of the many tools and instruments described above and in Appendix II, the following 10 measures appear to be the most influential and effective in the four regions considered and to have the most potential for adaptation to and widespread application in Ireland.

Communication/Information

1. *Awareness raising programmes*: these are apparent in each region, both at local and regional levels. The focus is often on the implementation of new programmes or policies so that the general public is aware of them. Such awareness raising has been a feature of some regions, especially Netherlands, Denmark and Austria for some time. Again such programmes are now under way in Ireland but many of these are quite new and the resources being applied are not as extensive as those in the four regions considered.
2. *Technical support/training*: again each region has provided resources and expertise to commercial enterprises and industry, so that these potential large sources of waste can reduce their outputs. This information-based support can come from public bodies themselves, or agencies or centres set up and funded by public and public/private sources. This type of information is greatly lacking in Ireland, which means that even those companies that wish to prevent waste are not being aided, and have to invest in private consultancy and training – sometimes at a cost unsupportable by smaller companies.
3. *Research*: research is widespread in all regions, and the required resources have been made available to increase knowledge bases, and to properly inform and direct policies and programmes. Before information based support can be made available, the correct information needs to be identified and accumulated. Research is the first step in building competence at regional or sectoral levels. The results of such research can then be made available widely to all relevant stakeholders. In Ireland, the recent ERTDI programme has improved the information base and knowledge levels, especially in relation to waste. But such programmes need to be ongoing and the required resources need to be made available, so that new programmes can continue to meet future challenges and increase competencies on as wide a scale as is possible.
4. *Green public procurement*: this tool (which may also qualify as regulatory and economic) has been recognised in each region, and has been especially emphasised in Austria, which has developed supporting legislation and guidance. Denmark has also produced 50 guideline documents to aid public and private purchasers and specifies. This instrument is seen as vital for three reasons. Firstly, since public agencies are major consumers and waste producers, their activities can have a great effect. Secondly, since the local and national governments are implementing policies and legislation, they must be seen to be providing exemplary actions. Thirdly, the experiences of public agencies in green procurement can provide better guidance and prove to private consumers that such policies can work and be effective. Again, in Ireland, such policies are very few and far between and since those implementing legislation, charges and policies are not seen to be leading by example, it is more difficult to improve domestic and business based behaviour.

Economic

1. *Environmental taxes and charges*: Denmark, in particular, has used taxes in a wide variety of areas, not just waste, to great effect in changing how consumers behave (DEPA, 1999a). The emphasis in the Netherlands and Flanders is more on charges – whereby domestic waste charges are weight or volume related, high costs for incineration and landfill are a deterrent etc. In Ireland such charges are now also becoming apparent, with a landfill levy, a plastic bag levy, the commitment to a carbon tax etc. However, again these are at an early stage and need to be developed further and widened in scope. A small few local authorities have recently begun to implement differentiated domestic charges, which have a high potential

level for waste prevention in this difficult societal sector. This type of domestic charge, however, should be initiated much more widely.

2. *Producer responsibility*: the responsibility of those who manufacture products, using raw materials and producing waste, is recognised in the four regions considered. In Austria, for example, the waste packaging compliance programme has had a major effect. This responsibility is mostly through voluntary agreement, or covenants, especially in Netherlands and Flanders. In Ireland, such a compliance scheme is in existence for packaging waste, but other streams also need to be tackled.
3. *Economic supports and grants*: it has long been accepted that economic support to industry is required to stimulate better environmental behaviour and innovation. Such grant aid is required for companies with individual programmes in mind and also to stimulate research and development. In the regions considered, it appears that such grant aid is more effective in the long term if applied to intermediaries rather than companies themselves. Secondly, they are usually applied in response to specific measures and legislation to aid companies to adapt and develop best practice procedures. Again in Ireland, such supports and grants are quite new but two cleaner production grant schemes have been funded by national government. Further preventive based support mechanisms are required, both at a company level and through intermediaries.

Regulatory

1. *Restrictions and bans*: product, or disposal bans are apparent in all four regions considered. The banning of the disposal of certain recyclable and commercial waste streams is widespread and the phasing out of certain substances has been under way for some time. Further, the required standards for disposal methods such as landfilling and incineration have greatly increased, providing a deterrent to those options. In Flanders and Denmark, the segregation of domestic household waste is also mandatory – otherwise it will not be collected for disposal or recycling. In Ireland the banning of recyclable commercial waste is planned from March 2003. Some local authorities had implemented such bans on an individual basis. However, the mandatory segregation of domestic waste is rare and should be made more widespread. Greater restrictions and higher standards regarding permitting and landfill management are also in place since the *Waste Management Act, 1996*.
2. *Agreements and covenants:* these are especially prevalent in Flanders and the Netherlands where there is a long history of good co-operation between authorities and industry. They are used in particular to implement producer responsibility, though an innovative system of agreement between local authorities and national government is also in place in Flanders. In Ireland, as stated above, one compliance scheme is in place for certain producers of packaging waste, but other such schemes are required.
3. *Industrial permits or licenses:* The IPPC licensing system is widespread in Europe, and has also been implemented well in Ireland since 1996. However, the legislation for smaller, non-IPPC companies seems to be much stronger in other regions than in Ireland – in particular the waste requirements for companies in Austria seems particularly strong. **The responsibility of non-IPPC companies regarding waste should be developed further in Ireland – the legislative requirements for a waste audit and reduction programme outlined in the *Delivering Change* document, for example, should be implemented in the near future.**

6. Framework for a Waste Prevention Strategy in Ireland

6.1 Introduction

The most recent waste trends and data in Ireland, as described in Section 2 give cause for great concern. Arisings are closely linked with high GDP rates since 1995, with annual increases of almost 10%. Landfill dependency remains above 90%. These trends are especially alarming when compared with the results of some more successful regions and countries as described in Section 5.

Some tools and instruments have now been begun at national and local levels, as described in Section 3, with possible potential to reduce these trends. The policy document, *Delivering Change*, has outlined some further initiatives, in particular a National Waste Prevention Plan. But the relatively poor emphasis on prevention in the regional waste management plans is worrying, since these reflect the actions being carried out on the ground, by local authorities.

It is also clear from the many barriers to waste prevention outlined in Section 4 that Ireland faces a major challenge if waste and economic growth are to be decoupled and current trends are to be reversed. However, as described in Section 5, other regions were once faced with such challenges and have, to some extent, overcome them.

Ireland is a long way behind such countries and regions, but with the development of adequate and well resourced administrative and strategic agencies, with well informed and focused policies, strategies and plans and through the implementation of effective tools and instruments, this country too can achieve a reduction of our wastes and a more sustainable use of raw materials.

This section will examine what we mean by waste prevention, outline some of the framework elements required in a strategy for waste prevention, describe instruments and tools necessary to overcome the barriers currently in place, note the roles and responsibilities for waste prevention and recommend some of the key actions and developments required.

6.2 Definition of prevention

One of the initial steps for a Waste Prevention Strategy for Ireland is to put into print and action an accepted and understood definition of the term “prevention”. In many countries the term “waste prevention” has not been defined legally, but is derived from laws and regulations concerning waste. However, it is recommended that a clear and concise definition of the term “prevention” should be enshrined in Irish law, and that this term should be widely disseminated so that all concerned with waste management understand and accept it, to avoid confusion.

Building upon the definition in the Irish policy document *Delivering Change*, the term “waste prevention” is defined herein as:

> *Elimination or reduction at source of material and energy consumption, waste arisings (solid, gaseous, heat and liquid) and harmful substances.*

It is recommended that this definition be accepted, entered into legislation and widely disseminated.

The distinction that both quantitative and qualitative elements should be considered is important. It may be possible, for example, to reduce the quantity of waste from a product by increasing the hazardous nature of the materials used – that is not prevention. However, the substitution of non-

renewable materials with renewable materials in a product is prevention since it reduces the harmfulness to the environment.

As regards what such a definition would mean in practice, it is worthwhile to look at the standard waste management hierarchy options and to suggest which should be included in "prevention" as suggested in Figure 6.1.

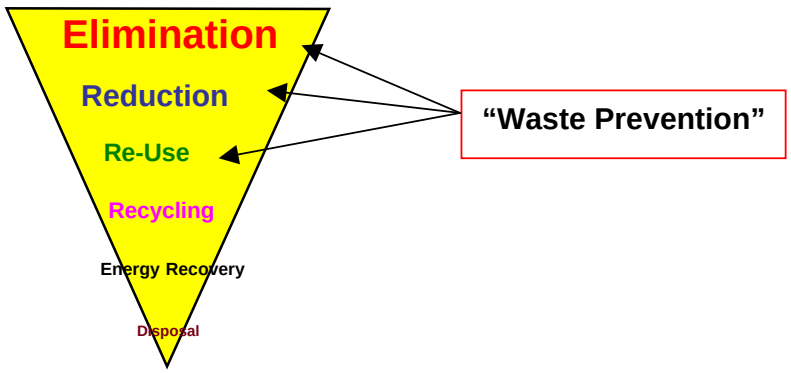

Figure 6.1. Waste management options included in "Waste Prevention"

The term "elimination" (also known as "strict avoidance") is generally defined as:

the complete prevention of waste generated by reducing material or energy intensity and/or by virtual elimination of dangerous substances in a product's complete life cycle. **(**OECD, 2000b).

– An example of quantitative "elimination" would be the removal of interim packaging for cosmetics and/or toothpaste

The term "reduction" (also known as "reduction at source") is generally defined as:

reducing (but not completely preventing) material or energy consumption and/or the use of dangerous substances

– An example of quantitative "reduction" would be the using smaller amounts of resources to provide the same product or service, e.g. reducing foil thickness, using less resource-dependent construction materials.

The term "re-use" is generally defined as:

the multiple use of a product or material in its original form, for its original or for an alternative purpose, with or without reconditioning.

– An example of "re-use" without reconditioning would be using the same shopping bag more than once. An example of "re-use" with reconditioning would be the refilling of glass or plastic bottles after washing.

In general, waste prevention is characterised by an occurrence or a measure *before* products or material are identified or recognised as waste – hence the term 'at source'. For this reason, "internal recycling", or recycling that occurs within an organisation or production process, before the product or material enters the waste stream per se, is also sometimes included in the definition of prevention.

However, what is clear and important to note is that "external recycling" (commonly known as "recycling") is *not* prevention, nor is energy recovery, treatment or disposal. In an Irish context, it is also important to note that "prevention" does *not* mean reduction of waste going to landfill. As noted in an OECD report: "The fact that recycling activities are more firmly established than prevention means that recycling will occur in disproportionate response to targets that only focus on reduced disposal" (OECD, 2000b). Furthermore, when considering means of measuring prevention (as is done in Section 6.3.3), the measurement of quantities disposed of to landfill cannot be used as a basis since diversion mechanisms such as recycling would then be included in reduction measures.

It should also be noted that 'prevention' applies not only to waste production. It must also incorporate resource consumption. Thus, reduced depletion of non-renewable resources by changing to renewable resources also falls within the definition of 'prevention'. Furthermore, on the output side, prevention encompasses more than just waste (where waste is traditionally taken as solid). Gaseous, and liquid wastes, waste heat etc. are also included.

6.3 Framework elements

In order for a waste prevention strategy to function effectively, it is necessary to put a framework into place to make prevention possible. Any such framework, such as those that have been described in Section 5 and Appendix II, requires certain core elements or foundations upon which it can be based. Without these building blocks, the necessary policies and subsequent tools and instruments necessary for waste prevention cannot be properly applied. The following foundation elements of any such framework are described herein.

6.3.1 Commitment, resources and structure

In all the four regions that have achieved successful waste management outlined in Section 5, clear and preventive policies were apparent as a first step and the required administrative infrastructure was set in place to achieve results. In Flanders, as far back as 1981, a dedicated waste agency, OVAM, was set up to tackle this issue. Such decisions showed the kind of commitment and leadership that is required – *as a first step* - to achieve success in relation to materials and waste. Another manifestation of such commitment is the level of resources allocated to the strategies in place.

As described in Section 3, a waste prevention policy statement, *Delivering Change*, was issued by the Irish Government in March 2002. This outlined some of the principles and policies of the Irish Government and described some of the planned actions to remedy the waste problems currently facing this country. Such a policy statement is an important step in the development of national strategies and plans, and in particular it paves the way for the establishment of National Waste Prevention Programme.

However, the development of such a programme, and the setting up of the Core Prevention Team within the EPA to drive it, have not yet been initiated within the year 2002, despite a funding commitment of €1.27 million for that year. A well-resourced Core Prevention Team and its engagement with a Prevention Programme Steering Group are an urgent prerequisite element of any framework for waste prevention. It should also be mentioned that the *National Hazardous Waste Management Plan*, which was published in July, 2001 is also not yet being implemented.

As regards the level of funding required for the development of such a strategy, it should be noted that in the National Hazardous Waste Management Plan, the prevention element was allocated £43.5 million (€55.2). It is recommended that at least the same level of resources for the prevention of non-hazardous waste would be required.

In the publishing of the *Delivering Change* document in March 2002, the Irish national government has shown the kind of commitment and leadership required to initiate the solution to Ireland's waste problems. However, policies in themselves are not enough, and the immediate actions required to fulfil such policies are urgently required, along with the resources to ensure that any strategy or plan will successfully function.

On a regional basis, however, unlike the national policy statement, the regional and local waste management plans, as outlined in Section 3, do not clearly indicate the kinds of measures and actions required to reduce waste arising in those regions. The poor quality of data trends prevalent in those plans, and the lack of concrete preventive-based measures outlined indicate the likelihood that waste reduction in those regions will not be achieved in the short to medium term. **Those factors combined with the general lack of knowledge and understanding of prevention in the plans, and the emphasis on recycling and waste disposal therein indicate that such plans require considerable amendment.** Greater leadership and commitment are required from local authorities, especially at the highest levels, in order for any improvement regarding raw material usage and waste in Ireland.

6.3.2 Data requirements

Any strategy for waste prevention cannot function without a high quality and focused data collection system for raw materials and wastes. It is not enough to generate general data on waste arisings and by what means it is disposed of. For preventive based policies and tools to be successful, it is necessary to identify how and why specific material streams are entering the economy. Policy makers and those charged with implementing local and national waste prevention plans must have adequate knowledge of what is happening to the material at each stage of its life cycle.

The recent Regulation on Waste Statistics[17] will help to mainstream data collection and render national comparisons possible, thus developing benchmarks. However, this does not go far enough to provide the required data and Ireland must go beyond this Regulation as the other regions described in Section 5 have done. Adequate resources and structures must be set in place at local and national levels to acquire and analyse such data so that the Core Prevention Team can utilise it to develop and implement effective measures for waste prevention.

6.3.3 Measurement of prevention

In order to ensure effective actions, it is necessary to regularly measure their success and failure. In the case of waste prevention it is often stated that it is difficult to measure what is not there.

Within the overall schematic of a strategy as presented in this document an important issue is the measurement and monitoring of performance. This is essential in order to evaluate the success of the strategy and also to provide a basis for refinement of elements of the strategy – such as goals and targets, selection of instruments, etc. The entire process should be dynamic and evolutionary, and effective monitoring will assist this evolution.

There are two main issues with regard to monitoring. These are criteria for measurement of prevention, and methods of measurement of prevention.

[17] European Parliament and The Council *Regulation (EC) No 2150/2002 of the European Parliament and of The Council of 25 November 2002 on Waste Statistics* 2002

1. Criteria for measurement of prevention

In order to measure prevention, it is necessary to measure:

- waste produced
- materials consumed (renewable and non-renewable)
- energy consumed (renewable and non-renewable)

It should be understood that waste produced is different from waste disposed of or treated. It therefore includes materials internally recycled in companies and excludes materials externally recycled.

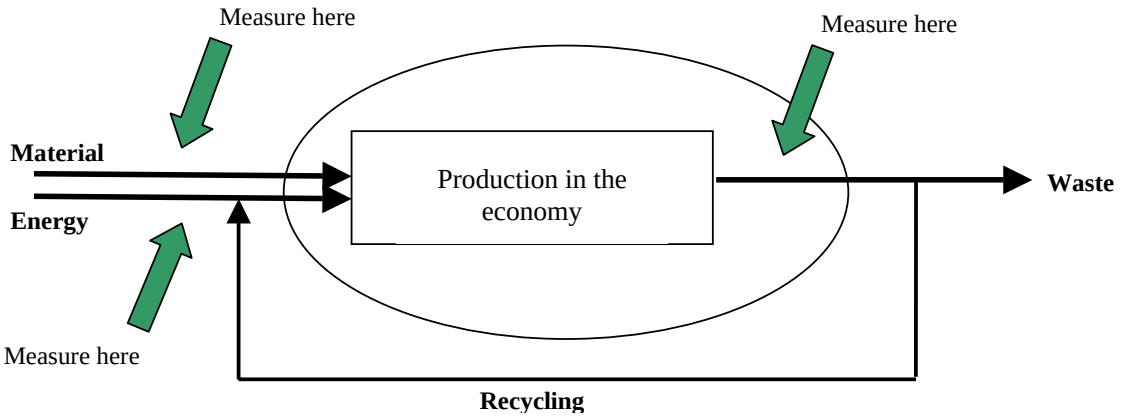

Figure 6.2. Measurement of energy, materials and waste in the economy

It is then necessary to decide on which basis the measured waste is presented. This can be a simple numerical value (such as tonnes of waste produced), or can be related to some other indicator, such as population or GDP.

The latter methods help overcome any fluctuations brought about by variations in economic activity, etc. Since an overall objective of sustainable development is the decoupling of environmental and economic performance, it may be suggested that a basic starting indicator will incorporate GDP. Thus,

Prevention indicator = Waste generated at time t ÷ Waste generated at time 0

Thereby a prevention indicator of less than 1 reflects a reduction (i.e. prevention); greater than 1 indicates an unsuccessful result, without prevention. Depending on requirements other factors such as GDP, population and material consumption may also be factored in.

While measuring quantities of waste and comparing figures may be relatively straightforward, if data is available, measuring qualitative prevention is more difficult and will require further study. It may be that some prioritisation of materials will have to be developed or utilised, so that different materials are weighted according to hazardous content, extent of hazard, whether they are non-renewable or renewable, reusable, recyclable, disposable, thermally treatable etc. However, extremely detailed information regarding material usage and waste would be required.

Further, when energy is considered, including energy requirements at all stages of a product life cycle, the measurement of prevention becomes very complex due to so many variables. Nevertheless, while absolute measurement may not be possible due to the large number of variables and complexity of issues, some general guidelines can and should be developed for an Irish context and utilised to inform and direct the future policies, programmes and initiatives of any waste prevention policy.

2. Methods of measurement of prevention

In order to apply indicators, such as the one above, methodologies to measure waste must be evolved. Likewise, the waste-stream must be identified. This can be on the basis of quantity (e.g. large streams, such as packaging), toxicity, economic value, etc. The scale of measurement should also be chosen. This can vary from production site level (micro-scale), through regional level (meso-scale) to national level (macro-scale).

Basic measurement parameters depend on these scales. For example:

Micro (factory) level: basic mass and energy balances – much information already exists in Ireland through the Annual Environmental Reports of IPC licensed companies. Such practices may be extended to other non-IPC licensed facilities through the audit scheme recommended by the *Delivering Change* document.

Meso/macro- level (regional/national): Material/substance Flow Analysis.

6.3.4 Targets

For any waste prevention strategy or plan to be effective, and in order to measure the effectiveness of any such programme, targets are necessary. Targets for hazardous waste prevention were developed for the *National Hazardous Waste Management Plan* (EPA, 2001b). Ireland has also set itself targets regarding recycling in the past and has current targets regarding the recycling of specific waste streams, such as packaging waste, C&D waste etc.

As we have seen in Section 5 and Appendix II, countries and regions that have begun to effectively grasp the issue of waste prevention, such as The Netherlands and Flanders, have set themselves specific and ambitious waste prevention targets. In the case of the Netherlands, for example, the approach is to set targets for waste arisings in relations to GDP. The currently expected target for the years 2000 – 2012 is that the annual total quantity of waste would grow from 57 Mtonnes in 2000 to 66 Mtonnes in 2012 which would imply a decrease of nearly 18% compared with the GDP. In Flanders, the 1997 *Implementation Plan for Household Waste* set waste reduction targets of 6% by 2001 and of 10% by 2006 for this sector.

While it is outside of the remit of this study to set specific targets for Ireland vis-à-vis waste prevention, it is recommended that, in consideration with the development of any national waste prevention strategy, that national targets regarding the reduction in growth of waste arisings should be set by the Core Prevention Team. These could take into account issues such as economic and population growths and could also, if sufficient data were available, specifically target certain societal sectors, trade groups and specific waste streams.

Furthermore, such targets should also be set at local and regional levels, in conjunction with local or regional waste management plans. It is not enough to set recycling targets as is done in these plans – waste prevention targets should also be set.

It should also be noted that in November, 2002, a European Commission spokesperson stated that in 2003 the Commission will make initial proposals towards establishing EU-wide waste prevention targets. David Grant Lawrence, head of the department responsible for waste and

resources policy, said a policy paper on prevention targets would be published separately from three other proposals also due in 2003: a thematic strategy on recycling, one on sustainable resource management and a white paper on integrated product policy. The aim was to "put objectives on what we're trying to do in waste prevention", he said in an address to the annual conference of sustainable resource management lobby group Assurre. He declined to elaborate on whether the targets would be binding or voluntary, nor whether they would be quantitative or qualitative (ENDS, 2002).

6.3.5 Communication/information; economics; legislation

As was seen in Section 5, the range of tools and instruments applied in The Netherlands, Denmark, Flanders and Austria encompassed these three main areas. These three areas should also form the basis or foundation any framework for an Irish waste prevention strategy.

As a starting point, the Core Prevention Team requires information in order to begin to formulate a strategy as well as to decide which tools and instruments should be applied and by whom. A detailed and comprehensive research programme should be set in place in order to fully inform the team and set out the step-by-step approach required by the team to develop a strategy. A series of discussions with national and international experts would be required, especially meetings and discussions with those who have developed such strategies in other regions and countries such as those outlined in Section 5. In order to focus the strategy, one of the first steps for the Core Prevention Team is to analyse the information gaps currently in place in Ireland – specifically in relation to raw materials flows, waste streams, etc. Of special significance here is the development of a fully functioning and active Steering Group, as outlined in the *Delivering Change* document, whereby other relevant bodies, social partners, local authorities etc. have an input to the strategy and inform the Core Prevention Team of critical issues. Since waste prevention is such a new topic in Ireland, the current knowledge deficit in the general public, business and local authorities is a major barrier to any strategy and must be tackled.

As stated in Section 4 the general lack of environmental awareness and knowledge in all societal sectors is a major barrier to waste prevention. Awareness of the Core Prevention Team and its work, and in particular of the national strategy, is essential for its success. A widespread and well-resourced information and awareness campaign is necessary, in order to make Irish people and specific stakeholders aware of any strategy. Specific awareness campaigns relating to individual streams or target groups will also be required, especially to support new initiatives and the implementation of new tools and instruments geared to improve consumer behaviour. Important issues in the development of such campaigns relate to what specific information should be communicated, by whom and using which media.

It is apparent that economic factors greatly influence behaviour at all levels of society, and impact on individuals in their daily lives, their work, social behaviour, consumption patterns etc. Some of the economic instruments and tools required for waste prevention have already been discussed and specific recommendations will be made in Section 6.4. What must be accepted, however, is that in some cases, the need for waste prevention is such that some difficult decisions will be required in order for any strategy to succeed. The implementation of such a strategy will require resources, but since prevention is the cornerstone of national policies and is universally regarded as a better option to recycling or disposal, it is obvious that the resources required for prevention should exceed those less sustainable options.

Some of the legislation in place in Ireland outlined in Section 3 does have potential for better waste management, and recent developments such as a landfill levy and the banning of certain commercial wastes from landfill will improve recycling levels and may also impact on waste arisings. However, further and more preventive-focused legislation will be required, in particular to support the kind of economic tools required. Certain legislation may also be required to impact

on domestic waste producers that will not prove popular – nevertheless, if Ireland is to grasp the nettle of waste as other regions have done, such legislation will be required as a critical framework element.

6.3.6 Material management focus

One of the defining elements of waste prevention is that it provides a fundamental shift of attention away from the traditional area of the end-of-pipe or the product end-of-life cycle, which traditionally have been the focus of most consideration in the past. Prevention, by its nature must focus on materials at all stages of their flow through economic and production systems, and in particular at the early stages of this flow in the product life cycle.

In Austria this emphasis has been recognised and is now the cornerstone of *The National Federal Waste Management Plan* of 2001 (Austrian Federal Ministry of Agriculture and Forestry Environment and Water Management, 2001) which states:

"In waste management, the successful implementation of sustainable principles increasingly requires that the consumption of materials is taken into account in its entirety, and material management should be based on ecological as well as on economic aspects.

"Goods production is for the most part dependent on the continuous exploitation of raw materials. Both the enormous consumption of fossil energy resources and the quantities of mineral raw materials exploited continue to present an upward tendency. The massive consumption of materials to meet the demands of the economy results in ever-increasing quantities of waste and pollutants.

"This development can be remedied by reduced material consumption on the one hand and increased implementation of a cyclic economy on the other hand, which provides for the options of re-use and recovery already during the production stage and, thus, helps to avoid pollutants. In this context, material flow management exerts a targeted influence on the use of materials.

"Material flow management always presupposes knowledge of the relevant flows of materials in order to be able to intervene into the system at the appropriate points. This creates considerable advantages, above all for sustainable industrial/commercial production."

In other words, **the main focus of any Irish National Waste Prevention Strategy should not be on waste per se, rather it should be on the whole issue of material management – at all stages of the material flow. Only by a reduction in the growth of raw materials consumption can waste and pollution also be reduced. Such an emphasis is a prerequisite for the success of any strategy regarding waste prevention.**

The Irish economy, especially since the 1960s has seen a trend in higher and higher material intensity per capita. All societal sectors, whether through private industry, commerce, households or public sector consumption, are part of this trend. Flows of materials, such as paper, metals, fossil fuels, etc. continue to grow. This is especially true of households as affluence becomes more prevalent in Ireland and new technologies provide new products that will eventually become waste. Furthermore, the number of persons per household is also decreasing in Ireland which means that the number of products, such as building materials, household appliances, vehicles etc. *per person* is also increasing. This leads to higher material flows and greater waste.

Thus in Ireland, there is a need to reduce the material intensity per service (or MIPS), and achieve greater dematerialisation. While these are new concepts in Ireland, they will require greater study and it will be necessary to incorporate such concepts into future policies and strategies.

6.3.7 Energy and equity

When considering prevention, three issues should be taken into account. These are:

- materials
- energy
- social equity

Within this document, emphasis will be placed on the first two.

As regards energy, this is an important factor and energy reductions are included in the definitions of the options "elimination", and "reduction" in Section 6.2. It may be possible, for example, to reduce the quantitative or qualitative waste of a product by greatly increasing its energy requirements at different stages of its life-cycle. This is not prevention. However, the switch from non-renewable to renewable energy sources in the manufacture of a product (though yielding no apparent quantitative or qualitative reductions in waste) is prevention, since it reduces harmfulness to the environment.

The consideration of materials and energy alone is the normal response of governments and agencies when considering sustainable development, since they are easily identified as both measurable and substantive factors. However, a third factor (social equity) must constantly be borne in mind. While it is outside the remit of this study to consider issues such as human rights, social equity, poverty, intergenerational equity etc. these are inherent elements of sustainable development and must not be ignored.

The links between such issues and sustainable development were explicitly expressed in the Report of the World Summit on Sustainable Development from Johannesburg in 2002 which stated:

"We recognize that poverty eradication, changing consumption and production patterns and protecting and managing the natural resource base for economic and social development are overarching objectives of and essential requirements for sustainable development.

"The deep fault line that divides human society between the rich and the poor and the ever-increasing gap between the developed and developing worlds pose a major threat to global prosperity, security and stability" (United Nations, 2002).

Further study of these issues in relation to Irish production policies, import/export issues, shipping of waste products to developing countries for recycling etc. is required. It is important that Ireland does not "import sustainability" by exporting its polluting industries to developing countries, moving towards lower-impact service sectors, and exporting its waste for recycling to countries thousands of miles away. The concept of sustainable development is based on the much-discussed "three pillars". These are economy, ecology, and, equity. Since prevention is an integral part of sustainable development – then it must also consider the same three issues.

6.3.8 Full life cycle approach

The environmental impact of a product is sometimes only considered at the end of its life cycle, when it enters the waste stream and, as a result, policies or programmes are sometimes focused on that stage alone. However, the effect of some products is far greater during an earlier stage of its life cycle. For example, the main environmental impact of a car or a washing machine is in its use, not its manufacture or disposal. Therefore, a reduction in the car weight (better fuel consumption) or the washing machine water consumption, has a much more significant effect than manufacturing process improvements (e.g. better paint spraying) or end-of life improvements (e.g. recycling rather than disposal). It is therefore important for any strategy on waste prevention that life-cycle thinking be incorporated so that better instruments can be applied to products at the most effective stage of their life cycle.

It is important for any strategy on waste prevention therefore that all life-cycle issues be considered before tools and instruments are applied that may focus, for example, on disposal, but not take into account design elements. This is shown in Figure 6.3.

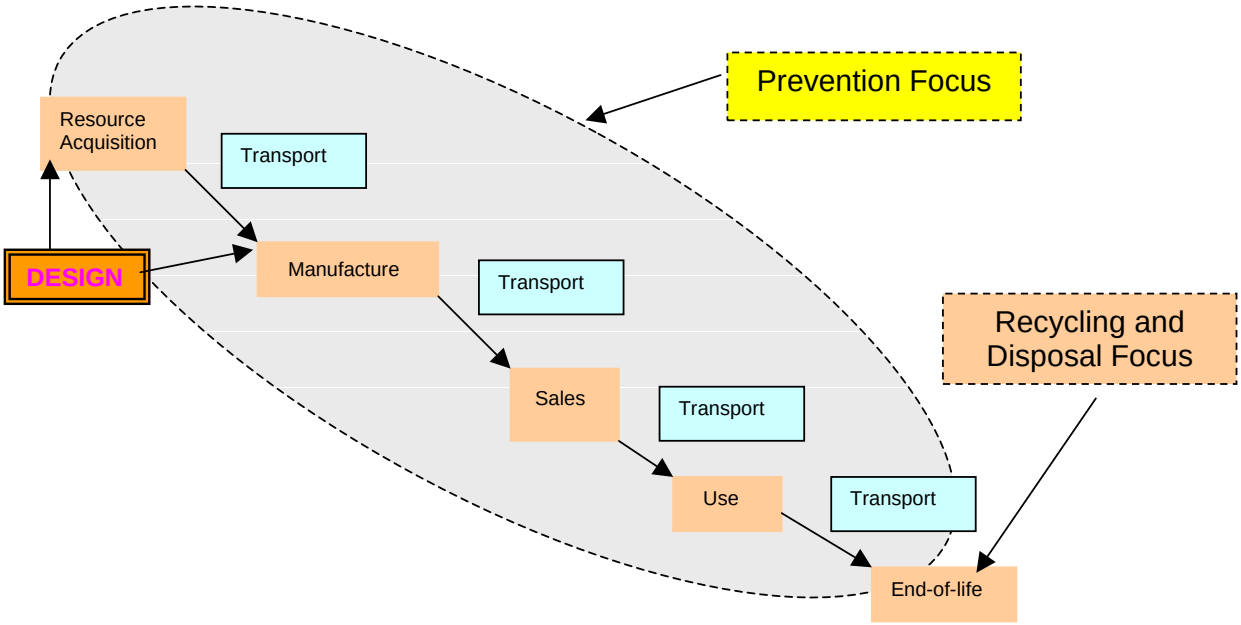

Figure 6.3. Full life cycle approach

6.3.9 Links to other strategies

As was mentioned above, issues such as energy, equity, and materials flow should be central to any waste prevention strategy for Ireland. Such a strategy should also consider and become consistent with other related and relevant national strategies. These include The National Climate Change Strategy (NCCS) and in particular the National Sustainable Development Strategy. Any initiatives from the waste prevention strategy should ideally provide a synergy to such strategies. As regards the National Climate Change Strategy some initial elements that have a particular relevance to waste management include the following Kyoto Protocol policies and measures that may require implementation:

- Enhanced energy efficiency.
- Research & development in the areas of renewable and new forms of energy, and advanced environmentally sound technologies.
- Removal of subsidies, taxes and exemptions that run counter to the application of market instruments.
- Reform in all sectors, including transport, to limit or reduce greenhouse gas emissions.
- CH_4 reductions in the waste and energy sectors.

The NCCS is recognised as requiring a concerted effort such as:

- Action should be taken in all sectors: - this would require citizens, consumers, business and economic sectors to make daily environmentally sustainable choices to ensure that Ireland's commitment is successfully achieved.
- Action should be taken early: - early action, having regard to environment and cost effectiveness considerations, is a cornerstone of the policies and measures in the Strategy.

Early action can focus on the adoption of existing technologies and the implementation of policies and measures shown to be successful in more mature economies.

- Action should be developed on a cost effective basis*:* - in the context of specific sectoral measures, in order to maximise economic efficiency and protect competitiveness within a sustainable development framework, emphasis should be placed on identifying and implementing least cost options to achieve reductions.
- Use should be made of the international Economic Instruments in the Kyoto Protocol - economic instruments comprise a variety of measures which use market processes to achieve objectives.

Similar efforts are required in a waste prevention strategy, whereby actions must be widespread, early, cost-effective and economic instruments would be required.

As regards the National Sustainable Development Strategy, certain principles were laid down upon which that strategy were based. These include:

- *The precautionary principle*, which requires that appropriate action be taken where significant evidence of environmental risk exists, and places emphasis on dealing with the causes, rather than the results, of environmental damage.
- *The principle of integration* of environmental considerations into other policies as a fundamental means of de-coupling economic growth and environmental degradation and promoting economic and environmental efficiency.
- *The polluter pays principle*, which correctly allocates the costs of pollution, energy consumption and environmental resource use, and the production and disposal of waste to the responsible polluters and consumers, rather than to society at large or future generations. Cost internalisation, including through market-based economic and fiscal instruments, provides a more balanced and full measurement of national growth and prosperity.
- *The principle of shared responsibility*, which requires broadly based involvement by public bodies, private enterprise and the general public to achieve sustainable development objectives.

These principles must all be respected in the context of a strategy for waste prevention.

Other, more waste related strategies or programmes should be integrated into a waste prevention strategy including those relating to specific streams such as biodegradable waste, waste electrical and electronic equipment (WEEE), construction and demolition (C&D) waste, packaging waste, end of life vehicles (ELVs) etc.

A strategy for waste prevention should also encompass The Hazardous Waste Prevention Programme, which was established as part of the National Hazardous Waste Management Plan, published in July 2001.

The development of such synergies and links with other strategies should be undertaken by the Core Prevention Team by discussion and agreement with relevant agencies and government departments. An initial study of where such overlap would occur would be required.

6.3.10 Qualitative issues

As mentioned in Section 6.2, qualitative as well as quantitative issues are relevant to waste prevention. Qualitative waste prevention in strictly waste management terms currently relates to the harmfulness of the waste under conventional waste legislation. In general, this should still apply under a waste prevention strategy. However other initiatives which go beyond current legislation should also be considered. Already a National Hazardous Waste Prevention Programme has been laid out since July, 2001.

One of the main problems regarding the hazardous nature of some products and materials relates to lack of awareness. Any waste prevention strategy should consider specific awareness raising programmes related to the harmfulness of certain products and materials and the potential usage of safer alternatives, in application of the precautionary principle. An initial study of the prevalence and usage of hazardous materials in Ireland should be undertaken whereby safer alternatives can also be identified. An analysis of how other countries with highly developed programmes regarding hazardous waste have improved their qualitative waste prevention performance should also be carried out by the Core Prevention Team.

The development of a Chemical Products Register for Ireland should also be considered. Such registers are already in place in some EU Member States and the Clean Technology Centre has already discussed this issue with respect to Ireland in one study (Duffy *et al,* 2000). This initial work should be further developed so that a feasibility study of such a register for Ireland can be undertaken. Since any waste prevention strategy will encompass the previously mentioned hazardous waste prevention programme the measures of that programme will also obviously apply.

In February 2001, The European Commission adopted a White Paper (COM (2001) 88final) setting out a Strategy for a future Community Policy for Chemicals. The White Paper advocates setting up a new system for the Registration, Evaluation and Authorisation of Chemicals (REACH) that will require:

- Registration of basic information for around 30,000 substances (all existing and new substances exceeding a production volume of 1 tonne) submitted by companies in a central database. It is estimated that around 80% of these substances would only require Registration.
- Evaluation of the registered information for all substances exceeding a production volume of 100 tonnes (around 5,000 substances corresponding to 15%) or, in case of concern, also for substances at lower tonnage; the Evaluation will be carried out by Authorities and include the development of substance-tailored testing programmes focusing on the effects of long-term exposure.
- Authorisation of substances which are carcinogenic, mutagenic or toxic to reproduction (CMRs), persistent organic pollutants (POPs) and possibly other substances (Deloitte and Touche, 2002).

This programme may subsume a National Chemical Products Register. Nevertheless, as a starting point, before hazardous substances can be managed and prevented in Ireland, it must be first known which and to what extent such materials are present, and how they are being used.

6.4 Potential instruments and tools for prevention

In order to build upon the core foundation framework elements described in Section 6.3, specific tools and instruments are required. As described in Section 5 and Appendix II, a wide range of such measures have been applied in some countries to develop the communication/information; economic and regulatory framework necessary for waste prevention. Of these, 10 specific measures were identified as having most effect and which could be either initiated or further developed in Ireland. These are listed in Table 6.1:

Table 6.1. Tools and Instruments to support waste prevention

Framework Element	Tools and Instruments
Communication/Information	Awareness Raising Programmes Technical Support/Training Research Green Public Procurement
Economic	Environmental Taxes and Charges Producer Responsibility Economic Supports and Grants
Regulatory	Restrictions and Bans Agreements and Covenants Industrial Permits and Licenses

6.4.1 Awareness raising programmes

The importance of a high level of environmental awareness to improve individual and collective material consumption and waste-related behaviour cannot be over emphasised. **Local and national awareness raising campaigns are required in Ireland on an on-going basis and with long-term commitment. These campaigns should be focused on general issues related to the environment and, in particular, on specific new initiatives, campaigns, and new measures being applied.**

The awareness campaign carried out by the DoELG for the implementation of the plastic bags levy in the year 2002 was a good example of such a specific and focused campaign. It targeted the most relevant people (shopkeepers and shoppers); it had a high profile and was made visible by posters and leaflets; it used different media such as the Internet, television, and radio; it was initiated early and gave consumers notice; it involved the print media with articles and press releases.

Such awareness campaigns can focus on particular waste or raw material streams and should contain both positive and negative elements – positive by showing the benefits of prevention and acceptable alternatives (and using success stories), negative by ensuring that those who are accountable for waste (i.e. all consumers) are aware of their responsibilities and the negative effects of their actions. Developments such as eco-labels etc. would be disseminated as part of such campaigns.

Awareness raising programmes are best done at a local level, using the correct agencies or bodies to affect specific Irish target groups. An example of how the performance of a small group can have a major effect can be seen in the Tidy Towns Campaign, whereby peer pressure

forces people to alter their behaviour and ensures and high level of response. Campaigns in urban areas can be done by residents' associations, with support from local authorities. On a broader scale, a campaign focused at one industrial sector could be carried out with the visible support of the umbrella organisation of that sector. Programmes targeted at specific population groups e.g. young people, should involve those groups in design and implementation.

A participatory approach is essential in the support of any new initiatives, plans or programmes. If those targeted do not feel involved in decision-making at some level, and consider themselves to be affected by 'top-down' approaches, they are reluctant to accept change. Consulting people, especially large population groups, after decisions have been made – as a token gesture – often leads to hostility and resentment and damages the effect of proposed programmes.

In the long term, the involvement of the Irish educational system in developing sustainable practices among the population is essential and has been proven to succeed in time in other regions. Ireland is conspicuous by the lack of focused environmental issues in its education curricula at primary, post primary and third levels. The low level of awareness in the general public, as shown in surveys as discussed in Section 3.6, and the resistance to behavioural change is caused in no small part by this deficit. While some school-based programmes described in Section 3 have had good effect, sustainable development should form a major element of all young people's formal education – which is currently not the case.

6.4.2 Technical support/training

As well as awareness of the problems relating to waste prevention, people, especially in their work, often require technical support and training in order to improve their performance. There is little point, for example, in implementing legislation or bans that affect small companies if those targeted are neither aware of the legislation nor know how it can be met. This very situation was encountered by some local authorities when examining the performance of the SMEs in their regions, whereby not only did those small companies not know if they were in breach of the law, but were not even aware of the law.

The successes achieved in regions such as the Netherlands and Flanders was due in no small part to the high level of technical support available, whereby companies received expert proactive support, specific to their needs, by picking up a phone or going to a web-site. Little or no such support is available in Ireland so that companies, small companies in particular, feel isolated and unsure about what to do, even when the will to make changes is already there. **Thus the setting up of a well-resourced and expert waste prevention information agency or agencies, with free-phone lines, a website, email access etc. is urgently required in Ireland. This should be put in place on a permanent basis**, and not for ad hoc issues, with guaranteed funding and support. It could also carry out specific preventive based research and develop guidelines and support material for a wide range of target groups.

These agencies or units could also co-ordinate, with direction from the Core Prevention Team, **effective training programmes,** again with general information or geared to specific industrial groups, regional groups, for the support of new initiatives etc. Such training would be made available cheaply and widely, with financial support from the local authorities involved, in conjunction with national government. This material should also support and give assistance regarding new legislative requirements for small and medium sized enterprises (SMEs), in order to aid compliance.

Specific and up-to-date sectoral guidelines should be produced by this agency or unit and made freely available on the Internet (or in paper for a nominal cost) to support the waste audit and waste reduction programmes outlined in Section 6.4.10. The funding for such initiatives should be derived from revenue earned through the application of disincentives, as well as contributions from savings made as a direct result of the success of waste prevention initiatives.

One of the main problems facing local authorities in particular is the lack of resources to link up with the main waste producers in its area and give effective informative support. Each local authority should employ at least one person (larger authorities would require more than one), dedicated to the development of waste prevention policies and programmes in companies and the development of best practice in its region. This person would co-ordinate their support with the national agency or agencies.

6.4.3 Research

As shown in Section 5 and Appendix II, other countries and regions have undertaken extensive and high-level waste-related research in order to inform relevant stakeholders and develop appropriate policies and initiatives. Very large and highly resourced research organisations dedicated to environmental issues are especially prevalent in Netherlands, Flanders and Austria.

Some research programmes, as described in Section 3, such as the ERTDI Research Programme in Ireland have involved some waste-related research, but **further and more preventive-focused studies are required in order to close the knowledge deficit that is currently present.** Such programmes should be ongoing and long-term funding must be made available and ensured. Resources are not just required on an ad hoc basis, when new legislation or pressures appear.

The barriers involving a lack of waste and materials flow data in particular needs to be tackled. While the *Regulation on Waste Statistics* will improve the quality of some waste data, **further and detailed information is required on specific industries, domestic material usage, regional material flows etc.** in order to develop an effective waste prevention strategy. At present, there is a major knowledge deficit in Ireland, which hinders the successful implementation of a waste prevention strategy.

Such research is required locally as well as nationally. One of the main problems associated with the local/regional waste management plans was the apparent poor quality of data – systems of data collection and analysis are required at local authority level so that this gap can be closed and adequate resources should be provided for such activity.

This research should be integrated with other related environmental and economic research programmes, associated with climate change, for example. The results of all research should be widely and effectively disseminated via the information agency described in Section 6.4.2. Subjects of initial interest and consideration for study should include:

- awareness raising and social change issues
- use of economic instruments – general and specific research
- development and implementation of new legislation, including restrictions and bans, agreements, audit requirements, licensing systems etc.
- material flow accounts
- design for the environment
- life cycle assessment tools
- cleaner production
- consumption patterns and their effects
- reduction in material intensity per unit service (MIPS)
- factor 4 and factor 10 issues
- dematerialisation techniques and methodologies

- development of green procurement policies and guidelines
- implementation of extended producer responsibility (EPR) programmes
- green accounting (at company, local and national levels)
- development of chemical products register and other hazardous materials/waste issues

6.4.4 Green public procurement

As described in Section 5 and Appendix II, green public procurement policies and programmes are widespread in regions such as Netherlands, Denmark and Austria. Austria in particular has formalised such policies in legislation and has developed guidelines and support documents to aid public agencies to green their purchase chain. The Netherlands has set a target for government agencies to reduce their paper consumption by 35% by the year 2012). While this tool could also be described as economic or regulatory based – and it should be enforced by regulation in the short term, it is primarily based upon good awareness levels among public servants and with the correct and supportive information.

One of the problems associated with improved performance in public bodies and local authorities is the lack of integration among different departments, especially in large organisations. (This is also true of the private sector.) A major benefit of green procurement is that it involves all departments in an organisation and affects all their purchasing policies. It is most important that environmental issues are thus integrated, at all levels in an organisation both horizontally and vertically. The finance department is especially important since so many decisions and issues critical to the environment are taken by finance departments, both in the private and public sector. However, support from the top managers in such organisations is a prerequisite for the correct policies to reduce consumption of unnecessary and harmful materials and the creation of waste. Green procurement policies and practices must, of course, be consistent with EU procurement rules.

The benefits of green public procurement are important for 3 reasons:

i) Public agencies have a very large purchasing power. This has been estimated to account for up to 14% of GDP (CEC, 2001a) (€12.3 billion in the case of Ireland), which will obviously account for a very large amount of raw materials and subsequent waste arisings. In particular extensive levels of construction work is carried out by or on behalf of local authorities, involving huge volumes of materials. Energy, water and other material consumption is also at a very high level. **One of the primary actions required to develop such procurement policies is to audit the organisations to estimate the amounts and types of materials consumed, where and why they are purchased and the subsequent wastes they produce.** In conjunction with a waste prevention plan, suitable green procurement policies can be developed and implemented.

ii) One of the reasons for public scepticism regarding being 'told what to do' in Ireland is that often the authorities themselves are major contributors to the problems, and do not provide exemplary behaviour. The environmental record of government offices and agencies, schools, universities, health boards, local authorities etc. can be significantly improved. Green procurement policies are not being implemented on a wide scale. It is vital that these offices and authorities are seen to be acting responsibly with respect to the environment, rather than just preaching good practice. In order for people to trust the information and advice they are getting from authorities, these organisations must be seen to be implementing best environmental practice. This will have a major spin-off effect on the uptake of initiatives by the general public and business.

iii) Some guidance has already been made available from the European Commission in the form of a communication regarding public procurement (CEC, 2001a). However, there

are still real and perceived difficulties in implementing greener policies without breaching purchasing legislation and free market requirements. Since Austria, for example, has succeeded in overcoming such problems, it obviously can be done. But the guidelines and supporting information required and the beneficial effects of such initiatives are also required. Public agencies can thus develop and provide such guidelines to the public sector so that they are not only leading by example, but also aiding business by providing practical experiences to implement such policies. Another spin off is that **as part of green procurement policies, public agencies can demand that private companies who supply to them have, at the very least, responsible environmental policies and programmes in place.** Since so many private companies depend on public contracts for their existence, this could provide a very effective tool to spread better environmental performance on a very wide scale.

6.4.5 Environmental taxes and charges

Environmental taxes and charges can be a very effective tool to promote waste prevention, as shown in Section 5. Denmark, in particular has implemented a widespread taxation system, based upon environmental criteria. Charges can be applied in several ways in Ireland, for example on products and/or their packaging, based upon the types of raw materials being used, their harmfulness to the environment, recyclability, usefulness or importance to society, difficulty of disposal, etc. Thus any such taxation system should be differentiated, with different levels applied to different materials and products. This is a form of producer responsibility, but it is often applied at the point of sale, which means that the extra cost is paid for by the consumer, rather than the manufacturer. This type of charge should be examined for potential in Ireland with a view to influencing the amount and type of raw materials being consumed, since it has potential to prevent waste at the source. The success of the plastic bags levy in 2002 gives cause for optimism about the feasibility and effectiveness of such charges. That levy has had quantitative and qualitative effects, with a substitution of plastic by cloth for many shopping bags and a reduction in the volume of plastic being used. It has also led to prevention through reuse, whereby stronger and more long lasting bags are being purchased and used by shoppers repeatedly. However, the growing trend whereby single-use paper bags are being offered by some stores is limiting the good effect of the levy.

Such levies or charges for other material or product streams should also be investigated further and implemented. Examples of such levies include: plastic packaging, aggregate and other building materials, newsprint, electrical and electronic equipment, vehicles, tyres, hazardous materials such as batteries etc.

Charges and levies for waste, at the end of product life-cycles are also worthwhile, mainly to promote recycling but also with some potential for prevention through reduction and reuse. Again this is a deterrent to the consumer, who may as a result, for economic reasons, reduce levels of consumption, use longer life products or chose less material intensive products. Already, a landfill levy has been applied in Ireland, landfill charges have increased greatly over the past 3 years and domestic waste charges have for the first time been applied in some areas (e.g. Dublin) and have increased greatly in some other areas (e.g. County Cork). However, domestic waste charges or a landfill levy will not influence domestic consumption unless they are applied on a differentiated scale, e.g. per volume. Volume related charges have been introduced successfully by some local authorities, to great effect. This must be replicated elsewhere – in particular in urban areas - but it is also possible in rural areas, as the example of Waterford County Council shows.

6.4.6 Extended producer responsibility (EPR)

Extended producer responsibility (EPR) applies the concept that producers of materials and products must take responsibility for the environmental impact of these materials, throughout their life cycle. This is another method of applying the polluter pays principle whereby those responsible for producing products (which eventually become waste) should pay the full environmental costs related to such products, during raw material extraction, production, distribution, sale, usage, recycling and disposal.

Already in Ireland one such compliance scheme is in place, whereby major producers of packaging waste are obliged under the *Waste Packaging Regulations (1997*) to take steps to recover that waste, by complying with the regulations or joining an approved compliance scheme. REPAK is the only compliance scheme supporting this legislation to meet Ireland's packaging waste targets under *Directive 94/62/EC on Packaging and Packaging Waste*. While REPAK was successful in meeting initial targets of 25% recovery, new Packaging Regulations were issued at the end of 2002 to assist Ireland's ability to reach the 50% target for 2005.

Other sectoral initiatives have also put into place in Ireland with respect to farm film plastic through the Irish Farm Plastics Group (IFFPG) and future measures will also be required due to the Directive End-of-Life Vehicles (ELVS), the Directive on Waste from Electronic and Electronic Equipment (WEEE), and the Directive on The Landfill of Waste. Responsibility for the recovery of construction and demolition (C&D) waste has been accepted by industry through the establishment of the National Construction and Demolition Waste Council as described in Section 3.

However, while these producer responsibility initiatives are welcome, they are mostly focused on recycling and do not, for the most part, consider ways and means to prevent the waste that is occurring from their products. Thus the focus on these schemes and initiatives must also encompass ways to reduce the amounts of raw material and energy being used as well as the environmental impact through wastes, noise and emissions during the full life cycle of products. This should be investigated in the development of a waste prevention strategy, involving research and discussions with the industrial groups concerned.

Other materials and products should also be considered for inclusion in EPR programmes, with a view to prevention, such as newsprint, office paper, plastic packaging, tyres, organic products, detergents and soaps, as well as hazardous products such as paints, solvents, batteries, certain bulbs, certain cleaning agents, oils etc. **The *Delivering Change* recommendation for the setting up of a Producer Responsibility Unit within the EPA would be a good beginning in this regard.** However, such a unit should be initiated as a matter of urgency with appropriate resources and powers to develop, implement and enforce suitable initiatives.

6.4.7 Economic supports and grants

Financial supports and grant aid to local authorities, individual companies, business organisations and environmental intermediaries are a feature of policies and programmes in several countries including the four regions considered in Section 5 and Appendix II. Denmark, Flanders and Austria in particular have provided relatively large amounts of money in support of such programmes in order to stimulate innovation and more sustainable practices. Since waste prevention is a relatively new subject in Ireland, with a previous focus on disposal and recycling, such economic stimuli are also required in this country.

While some economic grant aid has been applied by the EPA and Enterprise Ireland (as described in Section 3), this has achieved only modest success in developing a widespread change in environmental management system uptake, eco-design, and cleaner production. The current Cleaner Greener Production Programme, which has granted aid to 31 companies, aims to ensure

greater effectiveness with extensive public relations campaigns both to ensure uptake and widely disseminate its results.

However, there have been some problems regarding uptake of other grant aid programmes, and it appears that such aid should be focused on support for companies and local authorities to meet new pressures, or to support new legislative or economic requirements. It also appears that some companies are not adequately stimulated to accept such grant aid, grants are often only 50% of costs, or there may be a perception that there is too much red tape and reporting paperwork required by companies, especially smaller ones. These factors should be taken into account when developing and delivering grant aid in Ireland.

One finding of the series of PRESTI support programmes in Flanders was that it can be more effective to use intermediaries in the allocation of such support. This may also be one reason for the poor uptake of the UK Department of the Environment (DoE) government grant aid scheme, 'SCEEMAS' (the Small Company Environmental and Energy Management Assistance Scheme).

The diversion of such grant aid through an agency or agencies that will provide information and advice (as well as some funding) to companies may be an effective method of ensuring results. This links with the recommendations regarding technical support and training made in Section 6.4.2 above. However, such aid should be performance-related and only companies who have made real and substantial preventive-based changes in their approach should be funded.

Grant aid or support for information and training can be made via the funds generated by environmental taxes and charges and producer responsibility compliance schemes outlined in Section 6.4.6. The use of the Environment Fund in Ireland, which receives monies from the landfill and plastic bags levies and which is ring-fenced for environmental issues would be suitable in this regard. Financial aid from local authorities that seek to promote better environmental performance from business in their regions could also be used to partly fund such programmes and initiatives.

Local authorities should also be eligible for government grant aid for preventive based programmes and initiatives in their regions. However, such aid should be performance related and should conform to the policies and programmes of the national waste prevention plan. At present the emphasis in local authorities is on recycling and disposal, due to local landfill pressures and a general lack of understanding of prevention issues. Grant aid could also be made available to local authorities to fund training programmes to develop a greater understanding of prevention and sustainable development among all staff and not just those in environment departments and working with waste and landfills.

6.4.8 Restrictions and bans

Regulatory instruments are a major element of any waste prevention strategy and are widely applied in regions seeking to reduce landfill dependency and increase recycling levels. Restriction and bans can also stimulate quantitative prevention through reuse, elimination and reduction and if material specific bans in are in place, qualitative prevention will be supported through material substitution.

In the Nordic countries, for example, several harmful substances are being phased out from products, through long-term programmes. Since producers and importers of products containing hazardous materials are required by law to make product information available, this is possible and has been successful in many cases. In Ireland, also, certain hazardous materials are being phased out – an effective method of qualitative prevention.

Likewise in several countries a limit on packaging material is in place based upon Annex II to the Directive on Packaging, whereby excess packaging is not allowed. Such legislative can be effective, if enforced properly – however this particular regulation is not being enforced in

Ireland, despite being on the Statutes since 1998 (see Section 3.1.1). Product or material bans can only be effective if properly enforced. **As a start, the *Waste Management (Packaging) (Amendment) Regulations 1998* should be enforced by local authorities and other such restrictions should be considered.**

In most countries, restrictions and bans are in place regarding the disposal, especially landfilling of certain materials. In Ireland, now also, certain commercial waste packaging will be banned from landfills from March 2003. Previously, some local authorities had imposed landfill bans for commercial waste, due to diminishing landfill availability. In a few local authority regions, such as Galway, certain materials are also banned from domestic landfilling, since kerbside recycling is available for these streams.

In The Netherlands since 1995, 32 categories of waste (domestic, commercial and industrial) are banned from landfill, with mandatory separate collection of organic household waste since 1994. In Flanders untreated domestic wastes are banned from landfill since 1995 and domestic waste that can be recovered or incinerated cannot be landfilled since 1997. Again mandatory separate collection is required in Flanders, as well as in Denmark.

Such material stream bans and enforced segregation of waste is required on a wide scale in Ireland if higher levels of recycling and eventually prevention is to be achieved from this sector. This is especially true of regions where kerbside and bring site facilities allow for alternatives. Landfilling is still too easy an option for almost all domestic consumers and waste producers in Ireland.

Mandatory segregation of commercial wastes – not just for packaging waste - is also required in Ireland, again to increase recycling levels, but also to increase waste awareness and to aid companies to begin implementing waste reduction programmes in-house.

6.4.9 Agreements and covenants

A feature of some countries' waste prevention strategies is the use of agreements and covenants – this is especially the case in The Netherlands and Flanders. However, a distinction should be made between *voluntary agreements or commitments*, whereby an industrial sector, for example, commits to a certain level of recovery and prevention, in order to prevent legislative pressures and *legally binding negotiated agreements* whereby clearly stated commitments, time schedules, and punitive measures are negotiated, agreed and legally ratified.

In most cases, agreements and covenants are legally binding and are based upon legislative provisions, should the agreed targets and time-scales not be met. In the event of non-compliance, the relevant regulatory measures (usually based upon an EU Directive, such as the Packaging Directive) are then applied to the industry/business or material stream in question. Since the alternatives to such agreements are considered more punitive by business, involving take-back measures etc., the schemes, if properly set out and enforced, can be successful. The success rate for voluntary agreements has not been as high.

Agreements and covenants between business and authorities, or between national and local governments (as is the case in Flanders – see Appendix II) are attractive for both sides. The authorities are not required to implement costly legislation and set in place expensive enforcement administrative and legal frameworks. For business, as stated above, the potential alternatives are also less attractive. Again in Flanders, the covenants between national and local government were successful, **but only since they were performance-based and local authorities that did not meet agreed targets lost the subsidies from the national government.**

The Netherlands and Flanders have shown that such agreements and covenants can work, if properly laid out and with punitive legislative forces in place to ensure compliance. Likewise the packaging agreements in Austria and Germany have been successful, primarily due to the

relatively high charges applied to waste producers and the effective organisation of the programme. However, voluntary agreements are not proven and should be treated with caution.

6.4.10 Permits and licenses

As mentioned in Section 3 there are several regulatory instruments in place in Ireland that have already had some preventive effect, notably the EPA Act of 1992 and the implementation of IPC Licensing by the EPA since 1994. However, IPC licensing affects less than 600 companies in Ireland and thus has not had a widespread effect.

In this regard, the recommendation in *Delivering Change* that waste audits and waste reduction programmes be required of businesses should receive high priority since it can have an early, major and widespread effect in the business community – similar to that achieved by IPC licensing in those sectors affected.

A major study is required to develop audit criteria and develop a suitable format for a waste prevention programme. Any such audits should be preventive based, examining material flows through a company, and the processes and procedures in place – ultimately to acquire the necessary information to ensure real waste reductions and effective change. Discussions with concerned social parties must be undertaken to assess the effects of such legislation, and to establish suitable enforcement systems and procedures. Consideration should also be given to integrate such audits and waste reduction programmes with other media, such as noise, air and water emissions. **The current legislation regarding air and water control for non-IPC licensed companies requires a review to consider how it can be made more preventive in nature.**

Public organisations should not be exempt from carrying out such audits and waste reduction programmes. While green procurement is a major tool in improving performance of public bodies, internal performance regarding the use of resources should also apply. All relevant public bodies and agencies should also be required to accept legislative pressures to improve their performance and lead by example. Since, as is mentioned above, public bodies have the capacity to consume large amounts of material and produce high levels of waste and emissions, the impact of this legislation could also have a major and immediate effect and should be another high priority for the Core Prevention Team to achieve early results.

Furthermore, according to the *Waste Management Act, 1996*, there is a general obligation on all those carrying out agricultural, commercial, industrial and manufacturing to take all reasonable steps to minimise the production of waste from their activities. More stringent waste management permitting systems, now being implemented by the EPA, have had a significant effect in improving behaviour with regard to recycling and disposal.

In general, however, most subsequent legislation such as the Packaging Regulations relate to achieving higher levels of recycling and not to actual reductions in the waste volumes being produced. In order to achieve such reductions, **such companies should be required to investigate preventive methods.** However, in support of such legislation, a widespread information campaign should be undertaken, specific sectoral guidelines and supports should be made available along with training opportunities and, where feasible, financial supports, such as described above.

But such new legislation will not be effective unless it is properly enforced. **An immediate study should be carried out as to the cost and expertise requirement of enforcing such as major regulatory programme.** As in the case with IPC licensing, a phased implementation programme should initially be planned, based upon volumes of wastes and emissions. As with IPC licensing, the EPA would be best placed to enforce such a programme, due to its experience and knowledge base – however adequate resources would be required.

Table 6.2. Barriers to waste prevention and potential tools and instruments to overcome them

BARRIERS / TOOLS AND INSTRUMENTS	Throwaway Society	Convenience Society	Social Changes	Cheap and Easy Disposal	Infrastructural Deficiencies	Lack of Research	Low awareness	Lack of MF Data	Lack of Information	Lack of Waste Data	Lack of Economic Instruments	Legislation Deficiencies	Lack of Green public procurement	Lack of EPR	Design for Disposal	Lack of Enforcement	Lack of Business Champions	Lack of Resources	Lack of Administrative System
Awareness Raising Programmes	x	x	x				x		x								x	These barriers can be overcome by the framework element, *Commitment, Resources and Structure* as outlined in Section 6.3.1	
Technical Support/Training	x	x	x						x	x			x				x		
Research	x	x	x		x	x	x	x	x	x			x		x				
Green Public Procurement										x			x						
Environmental Taxes and Charges				x	x						x				x				
Extended Producer Responsibility											x			x	x				
Economic Supports and Grants					x						x				x				
Restrictions and Bans				x	x							x				x			
Agreements and Covenants												x				x	x		
Industrial Permits and Licenses					x			x		x		x			x	x	x		

6.4.11 Instruments and barriers

Table 6.2 indicates the 10 main instruments recommended for Ireland and which barriers they can overcome. These instruments can only be effective if used in conjunction with the framework of elements described in Section 6.3.

As can be seen, some instruments can have an effect on more than one barrier. For example, research can influence 11 of the 19 barriers identified – all those that require a development of the knowledge base in order to implement change. Conversely, some barriers need more than one instrument. For example, infrastructural deficiencies require information through research, along with economic assistance as well as regulatory support. In the case of green public procurement, obviously the required instrument matches the barrier exactly, but it would also require research and information provision to be implemented properly.

The main barriers to waste prevention are lack of priority and resources and lack of an adequate administrative system. These are not affected so much by individual instruments, rather by the framework element: *Commitment, Resources and Structure* described in Section 6.3.1.

6.5 Roles and responsibilities

The effective operation of any strategy will necessitate development of the foundation elements described in Sections 6.2 and 6.3 and the application of the tools and instruments recommended in Section 6.4 above. In effect, this is achieved by series of interlinked and integrated actions carried out by those responsible.

As is the case with most environmental activities, since everybody is part of the problem, everybody is part of the solution and thus we all have a role to play. However, certain groups in society have special responsibilities regarding environmental protection and others have major roles in developing the policies, programmes and action plans to achieve that aim.

With respect to waste prevention, nine such stakeholder groups are identified as having such a role and these are shown in Figure 6.4. Each of these stakeholder groups must be committed to the creation of a prevention culture in Ireland, whether as a waste producer, consumer, or in a role of policy maker, regulator, educator etc. Any successful prevention strategy must be inclusive, fully integrated with economic and social practices and incorporating all sectors of society. The specific actions required from each stakeholder group are outlined in more detail below.

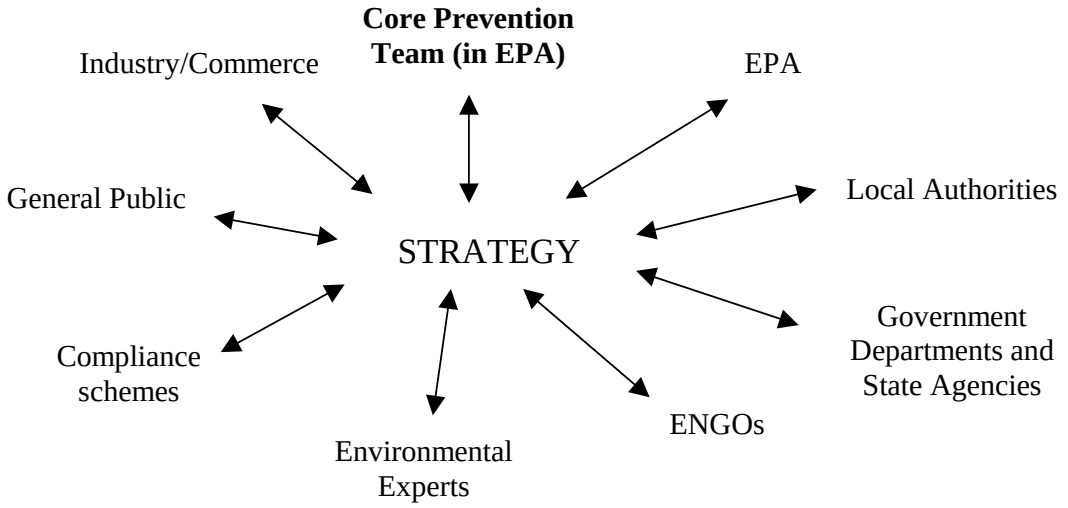

Figure 6.4. Main actors in waste prevention strategy

Nine main stakeholder groups are identified here as having roles to play in any waste prevention strategy. These include:

Core Prevention Team: this is obviously the main player since it will be responsible for development and implementation of the strategy as described in *Delivering Change*. The CPT, in conjunction with its steering group, will be primarily responsible for driving the strategy, liasing with the DoELG, identifying the main instruments and ensuring that they are applied, assessing the effectiveness of the strategy, informing all the required societal groups of its functions and actions, etc. The main actions required by the CPT are listed in Section 6.6.

EPA: while the CPT is obviously part of the EPA, the agency will also have a wider role to play in the enforcement of various legislation relating to waste audits and prevention plans, IPC licenses, waste permitting, landfill management, research, and other environmental related fields.

Local authorities: since local authorities have the main responsibility regarding waste issues on the ground, they obviously have a key role to play in the strategy. The first step for local authorities is to allocate environmental issues, and waste prevention in particular, the kind of priority required and the resources necessary. Secondly, the overworked and under-resourced environment departments in local authorities must be provided with improved staff levels, funding, better training and information provision and given a higher priority within the authorities.

Through developing and implementing more prevention-oriented waste management plans, local authorities must achieve the kind of results required for success through prioritising waste prevention above recycling and disposal, deploying the resources required, informing and education all their staff regarding prevention, leading by example through waste reduction programmes and green procurement policies, better information and engagement systems with waste producers (business and domestic), better infrastructural development through waste separation etc.

Government departments and state agencies: again the first role of the government is to allocate environmental issues and waste prevention the level of high priority required to protect our

environment. Secondly, the DoELG must be given the kind of resources and personnel required to develop the policies and legislation necessary to tackle the major issue of waste. In view of the environmental pressures that have arisen and the raft of new legislation and policies required by the European Commission and international agreements, the work load of this department has escalated hugely in recent years.

Specific to the waste prevention strategy, the Core Prevention Team must be funded and set up as a matter of urgency within the EPA and allocated the level of resources required to function effectively. Awareness raising campaigns on a national level are required involving several media including formal education systems.

Finally, all government bodies and agencies, along with their staff, have an exemplary role to play through better environmental performance, by reducing their impact through waste reduction plans, green procurement etc.

ENGOs: ENGOs have a role to play in bringing matters of concern to the public's attention and in campaigning for better performance from all concerned. ENGOs also have a major role in awareness raising regarding good behaviour and providing exemplary action and guidance on best practice within the community etc.

Environmental experts: Research is obviously an important element in any strategy development, especially in one relating to relatively new issues and pressures. Experts must carry out much of this research in co-operation with different societal actors, such as the CPT, EPA, DoELG, business, the general community, local authorities etc. By consultancy and support, training and education, such experts can greatly reduce the knowledge deficit apparent today.

Compliance schemes: while this group overlaps with industry/commerce, nevertheless it is likely that several such schemes will be in place in the near future regarding packaging, C&D, waste electrical and electronic equipment, end of life vehicles, tyres, newsprint, etc. Such schemes should not only focus on recycling, but must also consider ways to reduce and prevent waste from occurring.

General public: the performance of the general public in Ireland regarding waste leaves a lot to be desired. Every individual has a responsibility to reduce his or her environmental impact and minimise consumption of resources. The general behaviour pattern of blaming local authorities, business or national government is not acceptable unless individuals themselves make the lifestyle choices that have minimal impact on the environment.

Industry/commerce: as a major consumer of resources and producer of waste, industry and commerce have a leading role to play in any strategy for waste prevention. Through better and environmentally friendly purchasing programmes, greater eco-efficiency in its processes and more sustainable waste management, business interests can make a major difference. Through extended producer responsibility programmes, the application of the polluter pays principle, better awareness raising and education of staff, compliance with legislation etc., industry and commerce's response will be one of the main factors in the success or failure of any strategy for waste prevention.

6.6 Recommended actions

In all, 75 specific actions are recommended in order to develop the framework for a waste prevention strategy in Ireland, in order to implement the instruments outlined, and to overcome the barriers in place. The actions required are as follows:

Core Prevention Team (CPT)

As a matter of urgency, the following actions should be seriously considered for implementation:

1. Develop, implement and widely communicate a waste prevention strategy for Ireland. The Strategy should take account of the instruments and framework elements outlined in this study.
2. Develop audit procedures and waste reduction plan requirements for legislative implementation of a new licensing system in industry/commerce.
3. Set up and adequately resource a prevention focused technical support agency for Ireland.
4. Develop and implement, in conjunction with other relevant organisations, a training programme for business and public bodies.
5. Set up and adequately resource a long term and major waste prevention research programme incorporating subjects such as those recommended in this study.
6. Build upon the detailed information collected by the National Waste Database scheme by co-ordinating with other EPA departments, DoELG, local authorities and business in order to compile an accurate data collection programme for Ireland regarding material flow and waste.
7. Advise and liaise with DoELG and other relevant departments regarding prevention elements of green procurement procedures, economic taxes and charges, producer responsibility programmes, economic support systems, compliance schemes, and regulatory issues.
8. Develop a comprehensive waste-prevention awareness campaign, in co-operation with other programmes by DoELG and others.
9. In co-operation with DoELG, develop environmental grant programmes to support new innovations and better performance.
10. Assess the waste prevention strategy on an annual basis with full overall reviews every five years.

EPA

As well is its involvement through the Core Prevention Team, the EPA should also seriously consider for implementation:

1. Continued enforcement of IPC licensing, waste permits, landfills, etc. to a high standard.
2. Continued monitoring of the environmental situation in Ireland.
3. Setting up and developing an enforcement system for new auditing and waste prevention plan legislation.
4. Liaison between other EPA departments and CPT.

Local Authorities

Local authorities should seriously consider the following actions, developing further those that have already been initiated:

1. Prioritise environmental issues, waste prevention in particular, in the functioning of local authorities.

2. Allocate increased and adequate resources to environment departments within authorities, including training and education programmes.
3. Develop new local/regional waste management plans with greater emphasis on waste prevention than recycling and disposal, involving a high level of public participation.
4. Train and educate local authority staff regarding waste prevention and other environmental issues.
5. Develop and implement green procurement policies including consideration of the environmental behaviour of suppliers.
6. Full waste prevention audit and waste prevention plans to be put in place in all local authorities.
7. Develop a high level of engagement with local business and support for local business to reduce waste.
8. Develop better and more prevention focused awareness raising programmes for domestic and business consumers in regions, with dedicated and well trained staff.
9. Implement enforced waste separation systems for domestic and commercial waste in their regions.
10. Implement separate waste collection programmes in their regions.
11. Implement volume/weight related domestic charges.
12. Maintain landfill charges at their current punitive levels in their regions.
13. Undertake public private partnerships with appropriate business interests in order to develop a waste management infrastructure.
14. Implement current and future waste-related legislation, in particular *Waste Management Act 1996, Waste Management (Amendment) Act 2001, Waste Management (Packaging) Regulations, 1997* and *Waste Management (Packaging) (Amendment) Regulations, 1998.*
15. Investigate new and innovative waste prevention activities in society through pilot programmes and engagement with environmental experts.

ENGOs

ENGOs are a major stakeholder group regarding environmental protection and should seriously consider the following actions to support waste prevention:

1. Become involved in waste prevention related actions at a local level.
2. Actively support and take a role in the implementation of the waste prevention strategy.
3. Increase interaction with local authorities and in the development of local/waste management plans.
4. Increase public awareness regarding waste prevention through campaigns and other activities.
5. Continue to vigorously campaign for better policies and behaviour in other stakeholders, highlighting the potential for future improvements.

Government Departments and State Agencies

National government should seriously consider the following actions to protect the environment and support and waste prevention strategy:

1. Prioritise environmental issues and waste prevention to the highest level.
2. Allocate to DoELG the resources and personnel required to meet Irish international obligations and develop policies and programmes to protect the Irish environment.

3. Immediately set up and adequately fund the Core Prevention Team (CPT) within the EPA in order to develop a national waste prevention strategy.
4. In co-operation with CPT, implement legislation required to develop auditing and waste prevention plans in industry/commerce as well as government bodies and agencies.
5. In co-operation with CPT, develop and set up further environmental taxes and charges, on products and waste.
6. In co-operation with CPT, develop and implement environmental grant programmes to support innovative solutions and waste prevention projects.
7. In co-operation with CPT and relevant groups (such as REPAK), extend current compliance programmes to include prevention requirements.
8. In co-operation with CPT and relevant groups, develop and implement new producer responsibility programmes, agreements and compliance schemes, with a focus to reducing unnecessary raw material consumption and higher levels of prevention, for streams such as plastic packaging, newsprint, office paper, hazardous materials etc.
9. Further develop the *It's Easy to Make a Difference* awareness-raising campaign incorporating some of the elements described in this study.
10. In co-operation with CPT, develop and implement further waste prevention related legislation, such as product bans or restrictions.
11. All government departments, agencies and public bodies to carry out internal audits and set up waste prevention programmes.
12. All government departments, agencies and public bodies to develop and implement green procurement policies, including issues relating to environmental performance of suppliers.
13. DoELG, in co-operation with CPT, to develop and distribute guidelines regarding green procurement policies for public agencies.
14. Department of Education and Science, in co-operation with DoELG to develop sustainable development related curricula for primary, post primary and tertiary school systems.
15. All public servants to receive relevant environment and waste prevention related training and information.
16. Streamline planning legislation with a view to developing a waste prevention and recovery based infrastructure.

Environmental Experts

Environmental experts should be facilitated to undertake the following actions:

1. Carry out waste prevention related research and widely disseminate results.
2. Develop training programmes for business and other stakeholders.
3. Develop best-practice guidelines to support waste prevention activities for the public, business and public bodies.
4. Support and advise the Core Prevention Team in the development and implementation of a waste prevention strategy.
5. Advise and assist local authorities in the development of local/regional waste management plans, public private partnerships, and pilot projects.
6. Co-operate with other stakeholders to increase the knowledge base.

Compliance Schemes

Compliance schemes (involving suitable business interests) should ensure that participants seriously consider the following actions:

1. Engage with Core Prevention Team and DoELG in order to create schemes to reduce waste.
2. Engage with environmental experts to develop new and innovative methods of reducing material intensity per service (MIPS) and thus reducing waste.
3. Through engagement with suppliers and distributors of products and the general public, devise deposit, bring-back and reuse schemes to prevent waste.
4. Facilitate training programmes for relevant sectors to reduce waste.
5. Raise waste awareness to client companies and clients along the product chain.
6. Carry out research and best practice on production/distribution/ warehousing operations.
7. Disseminate results of research on best practice to the relevant sectoral groups.

General Public

The general public must play its role and seriously consider the following actions:

1. Reduce its environmental impact by minimising its consumption of raw materials and preventing waste, maximising recycling and responsibly disposing of residual waste.
2. Inform itself as to the best options regarding prevention and become aware of the main environmental issues of concern.
3. Become involved in local or national ENGOs and other groups and campaign for more responsible behaviour in other stakeholders.

Industry/Commerce

The following actions should be seriously considered by business and industrial organisations:

1. Carry out a waste prevention audit and implement a suitable waste prevention programme.
2. Develop green procurement policies whereby suppliers are also required to behave responsibly regarding the environment.
3. Accept and become active in producer responsibility programmes and relevant compliance schemes.
4. Engage with local authorities and, when appropriate, the EPA to ensure legal compliance and best practice.
5. Engage with the environmental technical information agency to ensure awareness of best practice guidelines and relevant.
6. Train and educate staff regarding environmental performance.
7. Engage with environmental experts to develop new and innovative methods of waste prevention.
8. Inform and raise awareness in customers and consumers about best practice and most appropriate consumer options.
9. Engage with local communities and other relevant stakeholders to develop a more participatory approach.

7. Main Findings and Recommendations

Ireland, without doubt, currently faces a major environmental challenge regarding its use of materials and energy and its management of waste. A radical, urgent and comprehensive response to this problem is required, at all levels in society, and utilising a wide spread of instruments and initiatives. One such approach involves the development and implementation of a waste prevention strategy and such a strategy is strongly recommended in this study.

An annual increase of almost 10% in waste arisings has occurred in Ireland from 1995 to 2000. This, combined with poor waste management, inefficient use of resources, a dependency on landfill, a resistance to change and an unacceptable level of illegal dumping are some of the manifestations of the difficult situation that pertains to this country.

This annual increase in waste creation appears to be in line with economic growth (as measured by GDP). Furthermore, when one looks at the relative stabilisation of waste arisings in other regions and their much better management, through recycling, for example, the extent of the problem in Ireland becomes clearer and of greater concern.

While some steps have been taken to stem this tide of waste, through developing the legislative framework, providing economic support, and raising awareness/information levels, it is clear that a much more extensive and integrated approach is required. The recommendations of the *Delivering Change* policy document of March 2002 in this regard are especially worthwhile, including the setting up of a Core Prevention Team within the EPA to develop a national prevention strategy.

Much of Ireland's current waste management system is based upon 11 local and regional waste management plans, now adopted. However, a study of these has indicated an inadequate emphasis on waste prevention issues, despite such a requirement under the *Waste Management (Planning) Regulations, 1997*. While these plans do acknowledge that prevention of waste is the priority, there is a lack of detail regarding specific measures to ensure that progress is attained in stabilizing and reversing the trend of waste growth. It seems clear that the science of waste prevention is still developing in Ireland, especially at local level, but it is also important to point out that some major elements of any prevention programme, such as regulation and producer responsibility agreements, require implementation at a national level. The quality of data trends and apparent underestimation of waste arisings in these plans gives further cause for concern. It is recommended that the review and redevelopment of the waste management plans provide further detail and emphasis on a more preventive approach.

Several barriers to waste prevention were identified in this report and provide a major obstacle to change, but Ireland's relatively poor performance to date is mainly a result of a lack of prioritisation of waste in Irish society and the lack of resources allocated to solve the problem. Furthermore, the administrative structure to manage waste prevention is currently underdeveloped and a dedicated body or team is required. In local authorities there is a particular need to provide adequate resources and training and to prioritise waste prevention over disposal and recycling.

A series of instruments and tools have been applied in some other countries to ensure successful waste management and a decoupling of economic growth and arisings. Four regions were analysed in this study. The Netherlands, Denmark, Austria and Flanders have all developed a waste preventive framework based upon a solid foundation of information/communication, economic and regulatory initiatives and instruments. 10 main instruments are identified and described in this study, which should also be applied and developed in Ireland.

In order to initiate a waste preventive framework for Ireland, it is first necessary to define prevention. The recommended definition herein (which builds upon that used in the *Delivering Change* document) for waste prevention is:

> *Elimination or reduction at source of material and energy consumption, waste arisings (solid, gaseous, heat and liquid) and harmful substances.*

It is important that this definition is officially recognised and promoted, so that all those involved in waste matters are aware of what prevention entails (which is not currently the case). However it should also be noted that when focusing on prevention, waste is not the only concern and the consumption of raw materials and energy, as well issues of equity are also of critical importance. Nor should only solid waste be considered: liquid, gaseous and heat waste etc. also require attention.

Any waste prevention framework will also require certain essential foundation elements upon which it can be soundly based. As a first step, commitment and leadership are required in all sectors of society to achieve success in relation to waste. Adequate resources must be allocated to any prevention strategy as a manifestation of such commitment. As regards the level of funding required for the development a national waste prevention strategy, it should be noted that in the *National Hazardous Waste Management Plan*, the prevention element was allocated £43.5 million (€55.2). It is recommended that at least the same level of resources for the prevention of non-hazardous waste would be required.

Other framework elements include**:** high quality data relating to waste and resources, the ability to measure prevention, the setting of realistic and effective targets, a solid foundation of instruments, a material management focus, the consideration of energy and equity issues, taking a full product life cycle approach, linking and synergising with other national strategies and a consideration of qualitative as well as quantitative prevention.

As stated above, there are 10 main sets of tools and instruments required to develop a waste prevention strategy. These include awareness raising, technical support and training, research, green public procurement, environmental taxes and charges, producer responsibility, economic supports and grants, restrictions and bans, agreements and covenants, and industrial permits and licenses.

However, a framework foundation, and a series of tools and instruments are not sufficient to bring about real change. What is needed most of all is action. Nine stakeholder groups are identified in this study, all of which have a responsibility to improve the Ireland's management of resources and waste and an active, major role to play in any strategy. These include: The Core Prevention Team, The Environmental Protection Agency, local authorities, Government departments and state agencies, environmental non-governmental organisations, environmental experts, compliance schemes, the general public and industry/commerce.

In all, 75 specific actions by these stakeholder groups are identified as being necessary, if any national waste strategy is to succeed. They are listed in the main body of this report. However, as a matter of priority, the following 10 measures are urgently required to accelerate the implementation of the prevention process, decouple waste arisings from economic growth and reverse current trends. These are:

1. Prioritisation of waste generation and material consumption issues in national government, local government, industry/commerce and among the general public.
2. Allocation of resources for an adequate response to the current persistent increases in the quantity and harmfulness of waste arisings.
3. Immediate setting up of a Core Prevention Team within the EPA, with support from a Prevention Programme Steering Group, and adequate resources to develop and implement a comprehensive and effective strategy.
4. Development of a waste prevention strategy for Ireland, incorporating the framework elements, instruments and actions outlined in this report.
5. Development of criteria for a waste prevention audit and waste reduction plan to be a requirement of Irish business and state agencies through regulation. Such regulation to be developed and implemented in the near future, incorporating green procurement.

6. Immediate setting up of a system of differentiated charges based on volume/weight for separately collected and treated waste, supported by the adoption of regulations and a well-resourced dedicated enforcement regime.
7. Setting up a technical support service designed to provide information regarding waste prevention to Irish businesses, develop sectoral and other guidelines, carry out research, and implement training programmes for businesses and state agencies.
8. Local authorities to take account of the preventive knowledge and experience accumulated by - the Environmental Education Officers, the Government Policy Statement *Delivering Change*, the recommendations contained within this study, the National Waste Database Reports, the outputs from the National Waste Prevention Programme and any other initiatives when the time comes to review their Waste Management Plans and thereby incorporate appropriate prevention initiatives within local/regional level action.
9. Implementation of a series of environmental charges and levies (building upon the plastic bag and landfill levies) on products and waste, implementing the polluter pays principle, and generating resources to co-fund the strategy in the longer term.
10. Development of a long-term and well-resourced research programme regarding materials and waste data acquisition, as well as several other critical issues.

These 10 priority actions are required to ensure the accelerated implementation of a prevention strategy and to provide early successes and results. However, in the medium to long term, all framework elements, instruments and actions described in this study should be considered in order to ensure that Ireland develops in a sustainable manner, providing a healthy environment and a strong economy for future generations.

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APPENDICES IN SEPARATE DOCUMENT

ERTDI Programme 2000 – 2006, Phase 2

Assessment and Development of a Waste Prevention Framework for Ireland

(Project Code: 2001-WM-DS-1)

FINAL REPORT

APPENDICES

APPENDIX I: List and Map of Regional and Local Authority Waste Management Plans Considered

APPENDIX II: Waste Prevention Measures Worldwide

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Appendix I: List and Map of Regional and Local Authority Waste Management Plans Considered

Table A.1. Regional and local authority waste management plans

No.	Region or County	Local Authority/Authorities
1	Connaught	Galway County Council Galway City Council Leitrim County Council Mayo County Council Roscommon County Council Sligo County Council
2	Cork City	Cork City Council
3	Cork County	Cork County Council
4	Donegal	Donegal County Council
5	Dublin	Dublin City Council Dun Laoghaire/Rathdown County Council Fingal County Council South Dublin County Council
6	Kildare	Kildare County Council
7	Midlands	Laois County Council Longford County Council Offaly County Council Tipperary NR County Council Westmeath County Council
8	Mid-West	Kerry County Council Clare County Council Limerick County Council Limerick City Council
9	North East	Cavan County Council Louth County Council Meath County Council Monaghan County Council
10	South East	Carlow County Council Kilkenny County Council Tipperary SR County Council Waterford County Council Waterford City Council Wexford County Council
11	Wicklow	Wicklow County Council

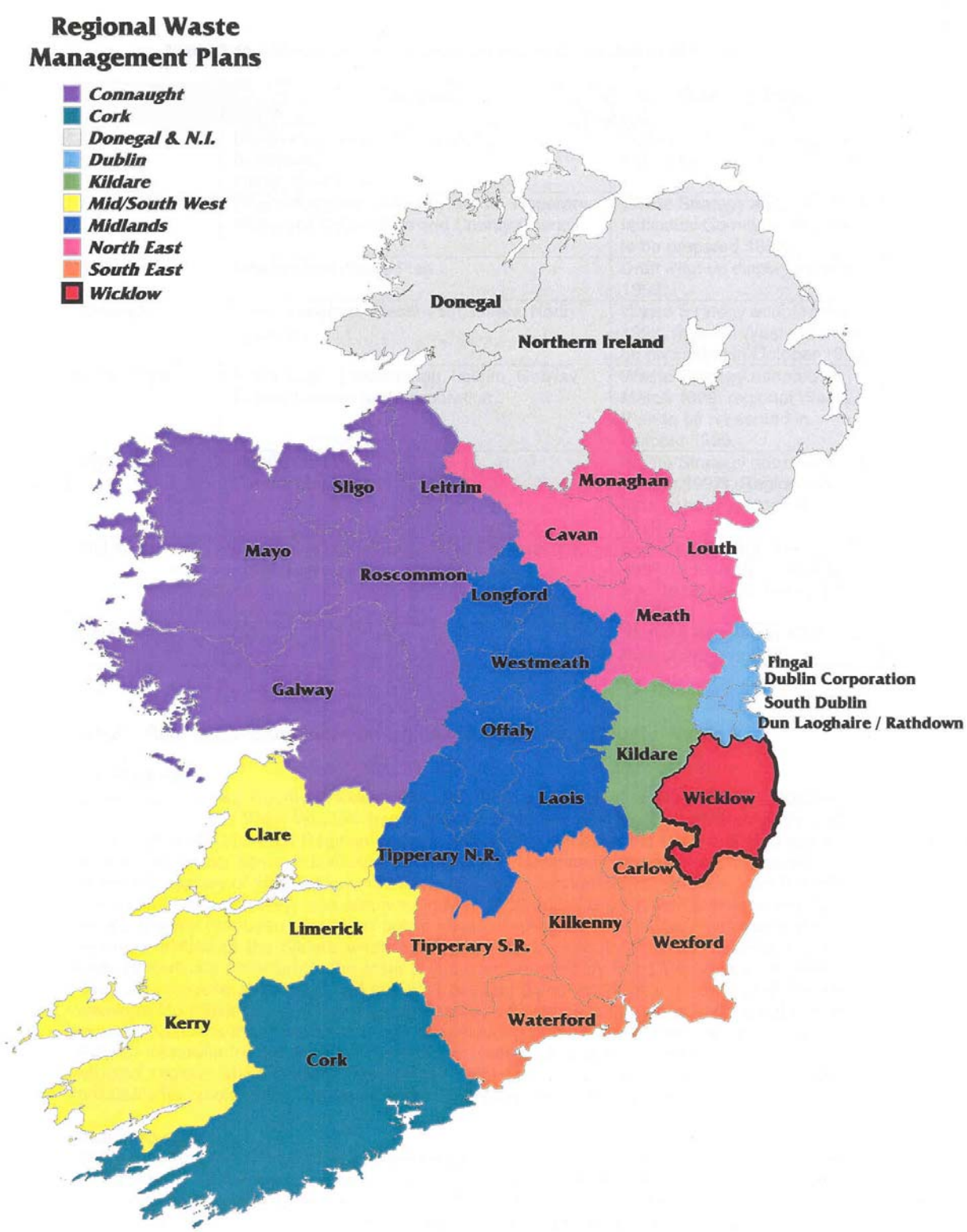

Figure A.1. Map of Ireland showing waste management plan regions[1]

[1] from *Wicklow Waste Management Plan* (Note: Cork City and County have separate plans, not indicated here)

APPENDIX II: Waste Prevention Measures Worldwide

1. Introduction

This Appendix gives further detail of an analysis of four regions' waste prevention policies and instruments: Netherlands, Denmark, Austria and Flanders. It supplements and should be read as an addendum to the outline given in Section 5 of the Main Report.

It also contains a comparison of 21 countries' waste prevention policies and measures carried out by the OECD from 1996 – 1998.

2. The Netherlands

Cornerstones of Dutch waste prevention policies

Waste management policies in the Netherlands put most emphasis on tackling the problem at the source and preventing waste from occurring in the first place. Only when waste cannot be prevented, should the next options, reuse and recycling be considered. Non-recyclable waste must be disposed of in a way that the risks to the environment are acceptable.

Waste prevention is defined as "avoiding or limiting the generation of waste by internal recycling or reduction at source" (Ministry of Housing, Spatial Planning and the Environment, The Netherlands, 2001c) and is one of the main objectives of the current waste policy. Prevention is required both quantitatively (in terms of the volumes of waste and emissions) and qualitatively (in terms of the reduction the environmental damage caused by the waste).

The focus of this prevention is not only aimed at waste management aspects. Prevention is also geared towards a reduction in the use of raw materials and energy in production processes, which in turn leads to less pollution and impact on the environment. This contributes towards a reduction in CO_2 emissions which aids the Dutch climate change policies. Such efficiencies in the production processes can also lead to reduced production costs, better working conditions and greater productivity.

Potential for waste prevention is considered to be present in the choice of materials (including internal recycling), the production process (technology, process implementation, good housekeeping) and product design.

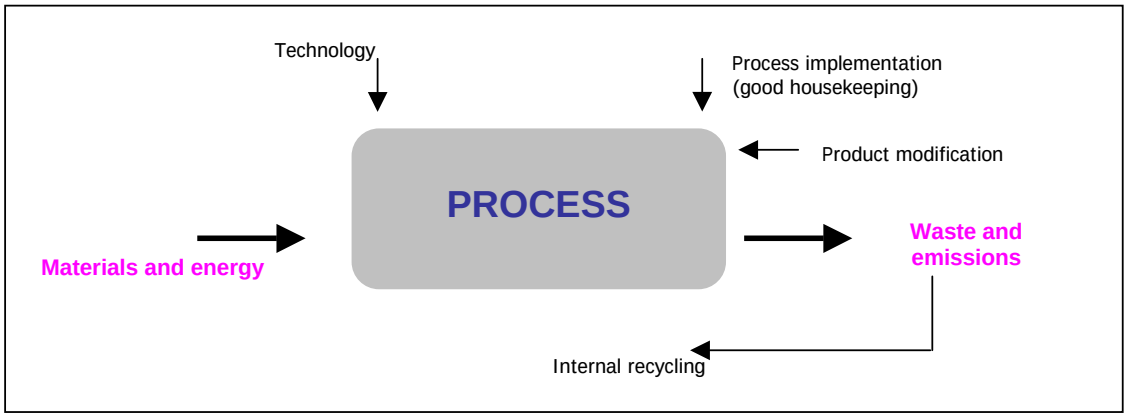

Figure A.2. Potential waste prevention options in the Netherlands (Ministry of Housing, Spatial Planning and the Environment, The Netherlands, 2002)

Objectives

The objective of the Dutch *Waste Management Plan 2002 – 2012* is to continue and extend the decoupling of GDP with waste arisings over that period. Three possible scenarios are considered:

- **The GDP scenario:** the assumption in this scenario is that the waste supply from the year 2000 grows at the same rate as GDP (growth of 38% between 2000 and 2012). This scenario is thus based on the assumption that the waste prevention result achieved in 2000 will be reverted. It approximates the situation in which the government no longer develops prevention policy and no longer encourages prevention, where the business community ceases efforts aimed at more efficient production and in which the influence of more independent developments (such as structural change in economy, change in investment patterns) on the waste supply is zero. In this scenario, the annual total quantity of waste grows from 57 Mtonnes in 2000 to 80 Mtonnes in 2012, in line with GDP.
- **The extrapolation scenario:** the assumption in this scenario is that the trend for relative decoupling between GDP and the waste supply that took place between 1993 and 2000 will continue between 2000 and 2012. This will result in a growth of waste arisings less than the growth in GDP. This scenario presupposes that prevention will develop further in accordance with that achieved between 1993 and 2000. It approximates the situation in which existing government policy and existing efforts by the government and the business community are continued. No account is taken of future changes in structure and investment patterns. In the extrapolation scenario, the annual total quantity of waste grows from 57 Mtonnes in 2000 to 70 Mtonnes in 2012. This means a decrease of nearly 13% compared with the GDP scenario.
- **The policy scenario:** the assumption in this scenario is that the level of relative decoupling between GDP and the waste supply between 2000 and 2012 will increase relative to the decoupling that occurred between 1993 and 2000. This scenario therefore results in growth in the waste supply that is less than the growth in GDP and less than growth in waste in the extrapolation scenario. The policy scenario is based on extra efforts by government, the business community and consumers regarding prevention measures, particularly for a number of priority streams. In addition, the scenario takes account of the influence of structural effects such as the trend towards a service economy, changes in spending patterns and dematerialisation. In the policy scenario, the annual total quantity of waste grows from 57 Mtonnes in 2000 to 66 Mtonnes in 2012. This means a decrease of nearly 18% compared with the GDP scenario and nearly 6% compared with the extrapolation scenario.

In the National Waste Management Plan the policy scenario is assumed. The three scenarios are shown graphically in Figure A.3:

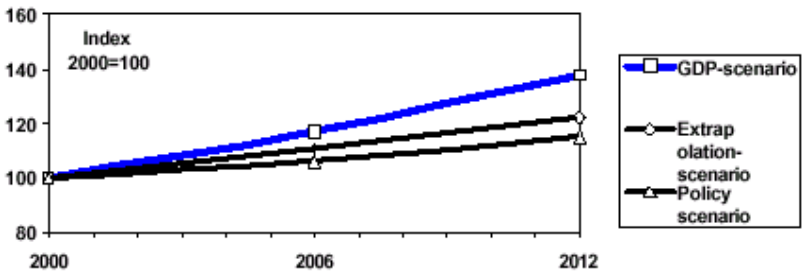

Figure A.3. Three scenarios of Dutch National Waste Management Plan, 2002-2012

Approaches – household/industry

The objectives above are expected to be met by a three level approach including:

- Continuing and intensifying existing efforts in the field of waste prevention.
- An integrated approach. This means not just a policy for waste prevention, but also for related areas such as energy efficiency and water saving.
- The further development of financial incentives and the launching of new implementation programmes.

Four other specifically targeted approaches are also planned including:

1. **Special attention and policy intensification for priority waste streams.** Priority will be given to:
   i) Waste substances that form the majority of waste disposed of in 2000 (incinerated in waste incineration plants and dumped). These include residual domestic waste and residual waste from trade, services and government. Together, in 2000, these streams amounted to almost 60% of the waste for disposal.
   ii) Waste substances for which there is considerable potential for waste prevention. These also include streams that are already reused. The most important are industrial (mono)streams and waste substances from the construction and renovation sector.
2. **Domestic waste prevention approach.** Residual domestic waste comprised a considerable proportion of the waste disposed of in the Netherlands in year 2000 and the percentage growth of this waste stream (unlike the overall waste) was greater than economic growth for the period 1985 – 2000. Influencing the behaviour of individual consumers and households has not been successfully achieved in the past. Nor has there yet been much success in drawing attention to the environmental consequences of consumption behaviour and the alternatives, so that the advantages of the alternatives could be understood and accepted, leading to a change in consumption behaviour. It is estimated that the environmental impact resulting from consumption within the Netherlands, in terms of emissions and use of space, energy and raw material will increase between 35% and 50% during the period leading up to 2030. Consumers are therefore becoming more and more important as a target group and as a market participant in a full product chain-oriented approach. For these reasons, in 2002 an implementation strategy "Sustainable Consumption" will be launched in the Netherlands. This strategy aims to make consumers aware and motivated regarding their consumption. In addition, alternative behaviour patterns will be developed, i.e. possibilities for consuming in a critical way and reducing pressure on the environment. Attention will also be paid to the role of the consumer as a market participant in the product chain.

   In advance of the "Sustainable Consumption" strategy, households are being urged to prevent waste by means of information, financial incentives (deposits, levies) and encouragement to reuse products.
3. **Integrated approach.** Waste prevention is not an isolated activity, but forms part of an integrated approach. Businesses, together with the competent authorities, will be required to examine the whole production process with regard to possibilities for preventative measures. Besides prevention of waste, for example, energy and water conservation are also examined. The integrated approach is aimed to have an impact, among other things, on licensing, information and communication. The programme's main objective is to reduce damage to the environment caused by commercial activities, whereby a contribution can be made to disconnecting pressure on the environment from economic growth. To put these objectives into practice, the programme has three main thrusts:

i) Policy track: this covers objectives aimed at establishment and harmonisation of policy and the role of the Inspectorate.

ii) Regulating track: this section contains objectives aimed at licensing and enforcement.

iii) Encouraging track: this contains objectives in the field of instruments, indicators, product and chain aspects, sustainable enterprise, sustainable purchasing, education and environmental performance within the business.

The concept of prevention relates to preventative measures in a broad sense. Besides a process-based or business-based approach, explicit attention is given to product-based and organisation-based approaches (environmentally oriented product development of product-oriented environmental performance) and to the full product chain approach. An important part of the regulating track from the programme is the "Subsidy scheme to reduce pressure on the environment". This scheme supports local authorities in implementing projects to achieve an adequate level of licensing and enforcement of waste prevention and energy conservation.

Central government is supporting the programme by means of a programme bureau. Special attention is being paid to communication and monitoring. As indicated, the chief objective of the programme is to reduce environmental pressures caused by commercial activities. The term "commercial" must be understood in a broad sense and therefore also applies to public authorities which purchase goods and services. Being responsible for the programme, they are expected to lead by example. One objective is for government organisations to reduce their use of paper by at least 35% during the National Waste Management Plan planning period. In the case of other commercial activities also, care must be taken so that prevention of waste substances forms part of the policy for reducing environmental pressures. These objectives are subject to regular monitoring to measure the programme's progress.

4. **Roles of public authorities and cooperation.** For a very long time, public authorities have been tackling the subject of waste prevention in the Netherlands, by undertaking a wide variety of roles. Provinces and local authorities are directly involved with businesses and consumers, for example with information on prevention, model projects and technical information. Central government usually plays a facilitating role, for example making financial resources available and providing information. This division of roles has to do with the direct relationship that the provinces and local authorities have with businesses, in their capacity as competent authorities. Local authorities are generally the initial contact point for citizens. This plan sees a new division of roles, with central government taking responsibility from local government regarding the control of waste. With this division of roles as a point of departure, the cooperation between public authorities during the National Waste Management Plan planning period is being continued. The shift of waste management tasks and responsibilities from provinces to central government means that provinces may feel an extra challenge and may make great efforts to achieve (waste) prevention in line with these programmes.

Instruments

Four groups of instruments are envisaged in the Dutch Waste Management Plan: communication, financial instruments, incentive instruments and regulatory instruments.

1. **Communication based instruments**: Communication has been and remains one of the cornerstones of waste policy in the Netherlands. This is particularly the case for very large and heterogeneous target groups such as consumers and small and medium-sized enterprises. Good communication is required partly in order to create a knowledge base and partly also to support injunctions and bans relating to these target groups. Examples

are the information campaigns on separate collection that local authorities run and the information provided by local authorities to small and medium-sized enterprises on the obligations concerning waste prevention and separation under their licences or general rules. More than in the past, the question is asked as to who is the most effective 'sender' of the message when setting up information campaigns. This means that players in the field such as the business community, environmental organisations, financial institutions and trade associations may be asked to play a role. Effective coordination between these organisations and a jointly defined 'message' are considered important conditions for making this approach succeed.

2. **Financial based instruments** : The use of financial instruments for waste management in the Netherlands has increased greatly in recent years. The introduction of environmental-based taxes, producer responsibility for a number of products, and rate differentiation in the collection of domestic waste are just three examples. The tax on waste landfilling introduced in 1995 has had an important controlling effect. Unlike a number of years ago, there is no longer any financial incentive to landfill certain substances instead of incinerating them, since incineration is now generally the less expensive option due to the landfill tax. As a result, the need to use 'injunctions and bans' to achieve full loading of waste incineration plants has diminished sharply. On 1 January 2002, the use of that instrument was further strengthened by an increase of €11 per tonne in the landfill tax. The purpose of that increase was to make the landfilling of waste more expensive than alternatives to landfilling and thus put an end to the landfilling of combustible waste. The (subsequent) separation of waste streams into substreams suitable for recovery was made financially more attractive by the increase. Should it become apparent during the National Waste Management Planning period (2002-2006) that the landfilling rates are still too high to achieve the desired waste management, the need for a further increase in the landfill tax will be reviewed.

   The introduction of producer responsibility for products such as white and brown goods and agricultural and horticultural film has also been applied as a financial instrument. Making producers jointly responsible for the management of their products at the waste stage leads to (some of) the waste disposal costs being incorporated in the product price. For products where payment in connection with scrapping poses a risk of the products being managed in an undesirable or illegal manner, this incorporation is considered important. In the case of vehicle tyres, for example, this was the reason for extending producer responsibility to include the obligation to collect scrapped vehicle tyres.

   The current indirect financing of the collection and processing of ship waste from inland navigation is somewhat similar. Here, also, the direct payment of the waste management costs on delivery would pose too great a risk of illegal conduct and was not implemented.

   Another major financial instrument applied by many local authorities is rate differentiation for the collection of domestic waste. Under this arrangement, households pay according to the quantity of waste that they offer. This is determined by, for example, weighing the waste offered or settling it on the basis of the number of times that a household offers waste for collection. Households are in this way given a financial incentive to offer less residual waste. This can be achieved by prevention or by separating the waste more effectively for recycling.

   The sale of waste rights, for example for the landfilling or incineration of waste, can also be regarded as a financial instrument. During preparation of the National Waste Management Plan, an investigation was performed on the scope provided by this instrument. The most important conclusion of that study was that the following conditions must be met before such a financial instrument based system can be introduced:

   a) There must be a liberalised market with free access and withdrawal.

b) There must be clear quantitative aims.

3. **Incentive based instruments:** Incentive instruments are expected to contribute in various ways to achieving the objectives of the National Waste Management Plan. The promotion of the development and transfer of knowledge will, for example, play an important role where there are technical impediments to sound waste management or where the stakeholders concerned are not fully aware of the technical possibilities. Examples include the contribution regulation on innovative collection techniques and the contribution regulation on reuse 2001 which is aimed at supporting the development of sales markets for secondary plastics. The latter regulation is jointly financed by the business community and the government.

   Incentive instruments are also worthwhile to provide a financial contribution for activities that lead to structural improvements in waste management. This instrument will be used widely in the years to come in order to support achievement of the objectives in the sphere of waste prevention and waste separation in households and (smaller) enterprises.

   The last category of incentive instruments concerns positive incentives, such as 'rewarding of good behaviour'. In fact, this is a special group of financial instruments. Examples are the exemption from/return of the regulatory energy tax and subsidies under the CO_2 reduction plan. It is being examined how such instruments can help ensure that subsequent separation and the use of high-calorie waste becomes widespread and that the current surplus of combustible waste is no longer landfilled.

4. **Regulatory based instruments:** Regulation in the form of injunctions and bans has always been considered for good waste management in the Netherlands. This is as a result of the fact that sometimes the waste management desired cannot be achieved through the use of any other instruments, and also because EU Directives make sometimes make such regulation obligatory.

   However, experience gained in recent years in the regulation of waste makes it clear that major financial interests in combination with an extensive and complex system of regulations have meant that the success of any regulation depends on good enforcement.

   Since the amount and complexity of such regulation is far greater than in the past, it is now therefore critically examined when introducing regulations whether the regulations concerned are enforceable and also whether adequate capacity is available for enforcement. The assumption is that the environment is better served by a few rules that are properly observed than by a lot of rules that are flouted. One point of concern in this regard is decision-making on regulations at European level. The reason for this is that the enforceability aspect often plays a secondary role.

   Self-regulation in the form of the quality assurance systems at enterprises and certification of production processes and products also plays an important role in guaranteeing sound waste management from the environmental health point of view in The Netherlands. The development and introduction of such systems is considered preferable and effective. This does not affect the fact that the government cannot blindly adopt such systems and must always have opportunities for monitoring and taking enforcement action. An important instrument in this regard is the system for reporting and registering waste.

   Agreements constitute a separate category of regulatory instruments. Experience gained with them in the environmental field (for example, the packaging agreement) shows that agreements can play an important part both in terms of achieving a basis for necessary measures and from the point of view of feasibility. As with injunctions and bans, however, monitoring of the implementation of an agreement must also be effectively regulated.

2. Denmark

Background

Waste 21, The Danish National Waste Management Plan (DEPA, 1999c) covers waste management in Denmark in the years 1998 - 2004. The waste management plan is a follow-up of the Danish Government's Report on Waste, presented in early 1998. *Waste 21* set the agenda for future waste management in Denmark. The plan gives a description of present waste management, initiatives already implemented, as well as new initiatives that aim to ensure better and more efficient waste management. The initiatives of *Waste 21* were also designed to be a signal to local councils of measures to be taken in the coming years which will be considered in the next generation of municipal waste management plans. *Waste 21* aimed to meets the requirements of EU legislation with respect to waste management plans, which must be drawn up by all Member States.

Main focus of Danish National Waste Management Plan

Waste 21 identified several main areas of effort to be tackled including:

- Separation of waste in more fractions (8 fractions are to be separated at source: organic waste, paper and cardboard, cardboard packaging, PVC, impregnated wood, waste electrical and electronic equipment, end-of-life vehicles and batteries).
- Greater focus on products.
- Focus on waste from enterprises.
- Improved quality of waste treatment.
- Waste prevention.
- Interplay between the Danish model and the EU.
- Transboundary movement of waste.

For the purposes of this study, the larger focus on products and waste prevention will be discussed in further detail below.

Objectives

The main objectives for waste management in Denmark are threefold. These are:

- Higher quality in waste treatment.
- Reduced environmental impact.
- Utilisation of resources in waste.

This implies a change in focus from the previous plan that covered the years, 1993 – 1997 which related to quantities[2] – now a new emphasis on qualitative elements is apparent. With *Waste 21*, Danish waste management aimed for improvements, entailing reduced loss of resources and better quality in waste treatment. The plan reflects the principles of ecological space and allows for larger participation of citizens and enterprises in waste solutions. Targets for the year 2004 are now:

- 64% recycling
- 24% incineration
- 12% landfilling

[2] The main objectives for the *Plan of Action for Waste and Recycling 1993-1997* were: Recycling: 54%, incineration 25% and landfilling 21% by year 2000 (these were broadly met).

New national objectives for waste management means increased recycling and reduced landfilling. Objectives have been drawn up on the basis of an evaluation of impacts of initiatives and an assessment of waste arisings for the year 2004.

In waste planning, it was considered necessary to examine the source and in Denmark specific initiatives are planned for specific sources of waste. The sources of waste meriting special attention are as follows:

- Waste incineration plants – objective by 2004: 70% recycling of waste from incineration plants.
- Building and construction – objectives by 2004: 90% recycling of C&D waste, sorting and separate collection of hazardous fractions, increased use of environmental design to reduce materials usage and prevent waste.
- Households - general objectives by 2004: increased focus on link between material consumption and waste amounts, maintenance of bottle return system, increased collection of hazardous household waste.
    - Domestic waste objectives by 2004: 30% recycling of domestic waste, 70% incineration.
    - Bulky waste objectives by 2004: 25% recycling, 37.5% incineration, 37.5% landfilling.
    - Garden waste objectives by 2004: 95% recycling.
- Industry – objectives by 2004: 65% recycling, 15% landfilling, improved collection of hazardous waste.
- Institutions, trade and offices – objectives by 2004: 50% recycling, 45% incineration, 5% landfilling.
- Power plants – objectives by 2004: reduction of coal based consumption, recycling of 90% residues from plants, environmentally acceptable recycling of bioash.
- Wastewater treatment plants – objectives by 2004: 50% recycling of sludge on farmland.

Waste Prevention

As can be seen from the objectives above, *Waste 21* for the most part concentrates on intensified recycling and higher quality in waste treatment, but the Danish government has also decided to focus attention on waste prevention and to launch initiatives in that area. Against this backdrop, a discussion paper on waste prevention in Denmark was prepared as a basis for the development of a strategy.

In the discussion paper, the overall target for the waste-prevention strategy is to stabilise the total volume of waste in 2004 and to reduce it in a longer perspective.

The goals are to foster the production, marketing and consumption of products that generate less waste throughout their product life cycles, to promote services limiting the use of materials and to engender a shift in attitudes and behaviour that leads to reduced waste generation.

Thus, the discussion paper underlines that the instruments proposed should create incentives for the various players that generate waste: consumers, service suppliers, manufacturing companies and the construction industry.

The instruments of the product-orientated environmental initiative are pivotal to waste prevention. But the instruments have a wider aim; consequently, one activity under the waste-prevention strategy will probably be to intensify the existing waste prevention in these instruments without triggering a corresponding increase in another type of environmental load (consumption of hazardous chemical substances, heightened generation of greenhouse gases, etc.).

Instruments, initiatives and target areas

A number of instruments, initiatives and target areas for Denmark are outlined in the *Revised Statement from the Danish EPA on the Product-Oriented Environmental Initiative* (DEPA, 2001b) approach for Denmark. These are summarised as follows:

- **Accumulation of knowledge, methodology and competence**: "Increased development and marketing of cleaner products basically require the construction of a sound foundation of know-how and the development of new methods. Know-how and methods must be adapted to and used by the market stakeholders while, at the same time, the stakeholders' competence to use the tools is strengthened."
- **Identifying and providing information on the environmental goals of the initiative**: "The central stakeholders must have knowledge and understanding of the environmental goals of the environmental problems prioritised by society. Short and long-term objectives must therefore be concretised and disseminated."
- **Life-cycle assessment methods, data and tools**: "The life-cycle perspective is the basic foundation for the intensified product-orientated environmental initiative. Refining basic life-cycle assessment methods is […] assigned high priority. In addition, a series of simplified and user-adapted tools must be developed. […] The credibility of life-cycle assessments is […] dependent on the underlying data being as qualified as possible and on the simplified tools used being based on an accepted foundation."
- **Product development and environmental management**: "Furthermore, the Danish EPA will continuously support the development of tools for supplier management and the use of environmental information in the marketing as well as initiatives relating to the possibilities for integrating the life-cycle perspective in environmental management."
- **Product development and green accounts:** "On the slightly longer view, it will be evaluated how green accounts may also be used for presenting information on the environmental properties of the products in a life-cycle perspective."
- **Competence building among key stakeholders**: "An essential prerequisite for enabling tools and information to be exploited is the availability of the right qualifications in the right parties. … (The) long-term competence building is expected to be guaranteed through the existing range of training programmes."
- **Environmental guidelines**: "Professional purchasers' prospects of identifying less environmentally degrading products must be strengthened by continuous publication of environmental guidelines for various product groups, selected on the basis of substantial market volume and sizeable potential environmental impact. Environmental guidelines also form part of public green procurement policy, which is described later on."
- **Eco-labels**: "When purchasing a product, it is essential for consumers to be able to immediately see whether a product is among the environmentally best in the product group concerned. Officially recognised eco-labels are the prime way of presenting such information, also to professional purchasers. On the short view, the objective is to have more than 1,000 eco-labelled products on the Danish market by end-2000 and to familiarise more than 70% of consumers with at least one of the two publicly recognised eco-labels."
- **New Danish eco-label secretariat and eco-label council**: "Annual action plans will be devised for the work of Ecolabelling Denmark. Along with these plans, the information campaigns and other information activities to be conducted in order to promote knowledge of the eco-labels will be described."
- **Environmental product declarations**: "Professional purchasers must have easier access to more detailed information on the environmental properties of the individual product. At the same time, the possibility must be investigated of devising an environmental product

declaration concept for special product groups in cooperation with the other Nordic countries."

- **Environmental manuals**: "For some products such as washing machines, batteries or cars, the environmental impact largely depends on how the consumer uses, maintains and disposes of the product. The Danish EPA will initiate a project involving relevant parties within the field with the purpose of evaluating in which areas consumers particularly need environmental manuals."
- **Information system of industrial environmental aspects**: "The establishment of an information system to be used by the public, local and central authorities, politicians, companies and other stakeholders is a new element of the product-orientated environmental initiative. The system should be set up to give users easy access to relevant information on industrial environmental aspects. It should give a complete presentation of existing data, such as emissions to air and water, waste production, EMAS registrations, environmental authorities and green accounts. The system may also be used to disseminate BAT notes, industry briefs, cleaner technology solutions and other regulative foundations. The system core consists of an overview of companies and emissions, and is comparable to similar systems in other countries."
- **Green guides**: "The green guide scheme includes close on 100 guides. These guides are employed all over Denmark to help citizens with concrete instructions on ways of leading a more eco-conscious everyday life."
- **Green taxes and other economic instruments**: "The market plays a central part in the product-orientated environmental initiative. This is where the strategy for a reduction of the environmental impact through supply and demand for cleaner products is to be realised. The market for cleaner products may be supported by use of green taxes and tax exemptions - just one of a number of control measures that may form part of the product-orientated environmental initiative. When taxes are imposed, this instrument must be used with the greatest possible consideration for competitiveness of Danish manufacturers and companies, and such taxes must be organised with a view to administrative simplicity and transparency".
- **Regulating use, etc. (Chemicals in products):** "Developments must constantly proceed towards the use of substances and products less hazardous to health and the environment. The production, use and disposal of environmentally and health hazardous chemical substances and products must be effected in a way that is safe to the environment and health. If production, use or disposal cannot be demonstrated to be safe with regard to health and the environment, initiatives must be taken to restrain problematic applications."
- **Initiatives based on the "List of Undesirable Substances**": "An essential part of the strategy is the listing of substances which, partly due to their environmental and health properties, must be regarded as problematic."
- **Activating and collaborating with stakeholders**: "There is a great need for extended collaboration and coordination between the parties playing major parts in the product-orientated environmental initiative. For the market stakeholders, the results should be binding agreements, preferably including areas, which would otherwise require more traditional regulations. "
- **Green public procurement policy**: "The public sector is under special obligation to lead the way in areas that the state wishes to promote. Increased, stable public demand for less environmentally degrading goods and services is considered an essential incentive for manufacturers and importers to market cleaner products. The Danish EPA will closely follow up on the circular on environment and energy considerations in central government procurement and request frequent reports from state institutions. The Agency will also intensify its information activities aimed at the state institutions. The Agency will continue to develop its documentation system for public procurement officers. "

- **Green purchasing in private organisations and the retail trade**: "Finally, the Danish EPA will promote a dialogue with relevant parties within the private sector in order to study the possibilities of consolidating the purchasing functions of private organisations and the retail trade. The Danish EPA will develop and communicate tools to help the retail sector in listing products in order of priority in relevant product ranges. The Danish EPA will adjust and disseminate the about 50 environmental guidelines presently available to private purchasers."
- **Coordinating stakeholders' activities**: "Within specific trades or product fields, the exchange of knowledge and the coordination of ongoing and initiation of new joint initiatives among the various stakeholders are of great importance in promoting less environmentally degrading products. Wherever possible, market stakeholders, from product designers to the waste-handling stage, must be involved in a binding collaboration for the development and marketing of less environmentally degrading products."
- **International activities**: "An international strongly goal-orientated product initiative is important for many reasons: the extensive Danish trade with the outside world means not only that a considerable share of our domestic environmental products comes from imported goods but also that exporting companies need uniformity on the international market with regard to the environmental standards with which goods have to comply. The resources being set aside in Denmark for establishing new know-how in the environmental field are modest, seen in an international context. International know-how is therefore a highly essential basis for Danish environmental protection work. Moreover, it is essential that Denmark should at least exert influence on the establishment of international regulations of special importance to the achievement of Danish objectives in the environmental field."
- **Developing and ensuring international product-orientated environmental initiatives**: "In several neighbouring countries (the other Nordic countries, the Netherlands, etc.) as in Denmark, there are a series of initiatives focusing on the environmental impact of products viewed in an LCA perspective. It is important that Denmark participates actively in the international work already under way in the Nordic countries and on its way within the EU and OECD. Denmark should influence the establishment of international regulations of significance to a product-orientated environmental initiative i.e. by participating in international strategy development in this field. […] Danish efforts must be adjusted, when required, in alignment with this international development."
- **Subsidies**: "Many of the new activities can only be effectively promoted with public support. The implementation of a series of essential initiatives for the development and marketing of cleaner products is to be ensured by opening possibilities for public funding. The proposed subsidy programme is intended to contribute to the creation of conditions in society for:
    - The development of products with improved environmental properties from cradle to grave, including reduced environmental impact during production and use as well as in connection with waste handling.
    - Ensuring that the environmental properties of the products become part of the market and competition conditions on equal terms with price, quality, function, etc.
    - Ensuring that each individual stakeholder group is able and willing to be involved in a reduction of the environmental impact from the production and use of products as well as during waste handling."

4. Austria

Specific principles to develop measures

As well as the general principles upon which policies and legislation are based (as described in Section 5.2 of the Main Report), it is also a requirement to develop more specific principles upon which effective and focused measures and instruments can be applied to maximum effect.

Qualitative and quantitative measures

In Austria, the term "quantitative prevention of waste" is used to designate the partial or complete avoidance of materials or processes which entail the generation of waste. The qualitative aspect refers to the toxicity and hazard potential of waste. Qualitative waste prevention is defined as the substitution of substances hazardous to the environment with substances that are environmentally less harmful.

Product related measures

In the area of waste prevention, differentiation can be also be made between product and plant-related measures. Generally, both qualitative waste prevention (in the form of a reduction of loads of dangerous substances) and quantitative waste prevention can be achieved through the implementation of product-related measures. This can be reinforced by regulatory political action (e.g. implementation of the End-of- Life Vehicle Directive).

When implementing the precautionary and polluter-pays principles, the recovery and disposal costs of a product should be charged as part of the product price, in the sense of internalising external costs.

The polluter-pays principle should also be taken into account by considering the product responsibility of the manufacturers and/or distributors of goods even after their intended use. Product-related waste prevention above all should encompass measures that:

- Allow for the repeated use of a product.
- Increase the product life.
- Change a product's design in such a way that the production waste, the waste volume following the use of the product and its polluting potential are minimised.

Plant related measures

The term "plant-related waste prevention" comprises measures taken to change a production process and/or plant technology in such a way that the waste generated during the manufacture of products is prevented at source. This is commonly (though not strictly accurately) known as Cleaner Production and there are many in-house options and procedures that can be applied to support Cleaner Production.

With respect to waste prevention measures, two further plant-related types of waste minimisation should be mentioned:

- Re-use is defined as the repeated utilisation of an object or substance in accordance with its original intended purpose.
- Further use is defined as the continued utilisation of an object or substance in an environmentally beneficial manner other than according to its original intended purpose.

Other production/trade principles

Some other principles regarding prevention measures that have been noted from past programmes and initiatives need to be applied before considering future measures and instruments. These include:

- Waste prevention entails immediate benefits, such as improved image and economic advantages.
- Numerous documented examples show that waste and emission prevention can be of economic interest. Apart from economically rational waste prevention, normative regulations for the creation of a further prevention measure potential are called for. Harmonisation at the international level is required.
- The Packaging Ordinance in Austria provided the impetus for innovative action in the commercial sector (especially in the area of re-usable transport packaging).
- The first limits of waste prevention are emerging (e.g. further reduction of the amount of packaging materials may reduce the stability of transport packaging and thus lead to more waste due to damage to goods in transit).
- With respect to the prevention of harmful substances, some improvements have already been made. However, there is still considerable prevention potential in the areas of product design, production and distribution processes. In this context, findings derived from various sector-specific concepts should be increasingly applied.
- Waste prevention within companies is primarily a task of management and hence should also be handled at that level.
- The more waste generated within companies is prevented, the more the product gains in relative importance with respect to future emissions/waste.

Consumer based prevention principles

Past findings from implementing prevention based measures and instruments for consumers include the following:

- Measures entailing a personal benefit are more effective than general appeals to the individual's sense of responsibility.
- The Packaging Ordinance in Austria led to a reduction in the quantities of residual waste.
- The total quantities of waste are still increasing.
- Beyond the issue of packaging, improved exploitation of prevention potentials in the household sector is only possible if consumer values change (increase in the consumption of immaterial goods at the expense of material goods).
- Developments will only be effective in terms of future trends if they are shared by 15% of the total population and include many different groupings within society.
- In order to be successful, waste prevention measures must be affordable, comprehensible, viable and attractive.

General Measures from the National Environmental Plan, 1996

The Austrian Federal Government *National Environmental Plan* laid out three general measures for resource/raw materials and waste management. These are:

1. Material balances

Raw materials, consumer and capital goods currently in service, as well as wastes must be managed together within the framework of a comprehensive material flow regulation system. This is only feasible using material balances.

The economy is not merely a set of individual economic units; rather, it comprises an interlinked system of material flows. Mass balancing encompasses the total inflow of resources into the economic system as well as the sum of all waste outflows and emissions leaving the system. Therefore, the manner in which materials are utilised, i.e., the management of materials, is decisive in determining resource exploitation and waste production.

Mass balancing implies the development of a holistic system - it is impossible to solve problems in one sector without substantially altering the entire system. This explains why the comprehensive concepts of mass balancing are the only means to efficiently (i.e., economically) manage both resources and wastes.

Pursuing waste management goals without incorporating mass balancing usually yields suboptimal solutions in the form of "reactive filters" at the end of the system rather than active solutions at the source. Quantitative and qualitative problems of the waste management and raw materials industry must be treated and solved jointly.

The current state of knowledge about material flows in Austria is considered inadequate. The available information is insufficient to steer material flows in a manner that guarantees long-term environmental compatibility or optimal utilisation of resource potential. The results of the working group (on material flows in Austria) show that only a few sectors have achieved a balanced flow of goods; in most, input far exceeds output, leading to great accumulations of material in the anthroposphere. Nationwide in Austria, material inputs exceed waste volumes by nearly one order of magnitude. Virtually nothing is known about the structure of stocks (buildings, infrastructure, for communication, transport, services, etc.).

Material balances enable early diagnoses about raw material supplies and environmental degradation. They also permit priorities to be set for environmental protection measures, for resource planning and for waste management. Finally, they provide a basis for environmental impact assessments, eco-balances, and eco-design.

Organisation and timetable regarding material balances in Austria were as follows:

1. Federal Government supports research on "Material balances" (1996).
2. Federal Government includes material balances in updated NUP versions (1995, 1998) and in the Federal Waste Management Plan (1995, 1998).
3. Federal Statistical Office and Federal Environmental Agency begin to collect data enabling material balances for individual substances (starting in 1996).
4. Provinces (e.g., in the Provincial Waste Management Plans) and major sectors of industry, especially the waste disposal industry, provide data for material balances.

2. Improved utilisation and disposal

Austria's waste management industry in 1996 was considered to be unable to fulfil all the targets laid out in the Waste Management Act (AWG). The call for conserving landfill space and for maintenance-free waste dumps (final disposal) was not taken up quickly. Fulfilling the goals of the AWG required significantly more waste treatment facilities. The demand for optimally

utilisating raw materials and energy had also not been met by 1996. In particular, no concepts had been developed on how to re-use and dispose of wastes in a productive framework that had the full support of the materials and energy industry. Although the principle of prevention is often cited in this connection, it has proven to be quite difficult to implement. Objective, quantitative criteria must be employed to better define and study this preventive potential.

Waste management must orient itself according to criteria inherent in the materials and substances under consideration themselves. Three of the four goals in the Waste Management Act pertain to such intrinsic properties. Protecting humans and the environment means limiting the impact of polluting substances. Conserving raw materials and energy, in turn, involves materials such as iron, aluminium, polyethylene, etc. In the context of environmental protection, the call for maintenance-free landfills also implies limiting the concentration of contaminating substances in landfill gas and leachates.

In the future, all waste management processes (technical and logistic) and systems will have to be reviewed and compared on the basis of how they alter mass flows. The prevailing knowledge on the transfer functions of substances during waste incineration can serve to define the state of the art. This information will be critical for designing future waste management schemes.

The following measures are recommended:

i) Separate quantification of the major material flows, i.e., construction debris, organic wastes and paper wastes, to enable selective treatment and recycling (private and public sector by the year 2000); priority should be given to measures at the source (selective reduction at homes and businesses and not at treatment plants; separate collection and treatment of uniform classes of materials; no mixing of wastes).

ii) Introduction of cost and quality controls in the waste management industry by the year 2000 (compare the costs as well as the mass and volume flows of goods, of materials and energy; compare environmental compatibility and the use of raw materials for, among others, waste management processes and systems). In the future, all waste treatment plants will have to operate under new quality standards equivalent to those already in effect for today's most modern facilities. This will also be binding for material recycling facilities.

iii) New Waste Disposal Act: this must resolutely pursue the targets specified in the AWG. The exemption regarding the disposal of carbon-rich wastes should therefore be deleted.

iv) Increasing the number of incineration and physico-chemical treatment plants in order to fulfil the target goals of the AWG and the forthcoming Disposal Act (private sector, municipal and provincial level by the year 2005).

v) Research/development on planning and construction of final disposal sites (federal and provincial level by 2005). The term "final disposal site" must be defined operationally, i.e., it must be specified according to chemico-physical, mineralogical and geotechnical criteria. Test procedures to determine the quality of final disposal sites must be developed. The structural features of final sites need to be investigated. Site-suitability for final disposal must be defined, and active searches must be initiated for such suitable sites.

3. Design products, processes and systems based on criteria of regional material balances, optimal use of raw materials, and long-term environmental compatibility

The most effective means of waste prevention is to incorporate the criteria of (multiple-) recycling and disposal directly into product and process design. However, although this measure can take hold relatively quickly (years) in the case of short-lived goods, the time scale for long-lived goods involves decades. Thus, waste avoidance through product design can only relieve the

waste management industry in the mid- to long-term. Over the intervening years to decades, disposal will therefore continue to be a cornerstone for waste management.

In the future, production processes must be designed to minimise waste accumulation. A number of successful examples demonstrate that this is not only feasible, but has in fact already been put into operation. Those retail goods that are the ultimate product of production lines (and therefore cannot be avoided) will become an increasingly important factor in future waste management. In service-oriented urban societies, the final consumers (i.e., private households and public buildings) are now becoming the main producers of waste.

Initial studies on the "metabolism" of modern cities show that urban material budgets remain to be optimised with regard to resource utilisation and long-term environmental compatibility. The storage compartments in the cities continue to grow: as input flows increase, it must be expected that output flows will increase as well. A key factor determining the magnitude of this metabolism is the structure of human settlements (e.g., the interaction between working, living, sustenance, shopping, traffic, leisure pursuits , etc.).

Published scientific results show that structural measures have the greatest impact on the sustainable use of the natural resources energy, raw materials and space. Physical planning instruments would be much more efficient than waste management measures in guiding urban metabolism towards sustainability. On the waste management level, a great number of statutes and regulatory measures that deal with ecologically sound material budgets are currently in the implementation phase or are in preparation. Structurally, economic development continues to proceed in the opposite direction, as evidenced by the increasing distances between the home, the workplace, shopping facilities and recreational activities.

The Austrian National Environmental Plan, 1996 recommended that the following measures be applied at the level of products, production processes and regions:

i) Promote research and development on "green" products and low-waste processes (Federal Government and the commercial sector over the following 10 years).

ii) Introduce new purchasing and promotion strategies for goods and services by the Federal Government, provinces and municipalities (short- to medium-term).

iii) Incorporate criteria relevant to regional material budgets in land-use planning. In general, make sure that all public agendas incorporate ecological considerations, even those that are not primarily waste management-related yet relevant for material flows (economic development, the workplace, the planning of future residential structures, traffic and energy planning). This will be an ongoing task for the Federal Government, provinces, municipalities and the private sector over the next decades.

General measures, actions and instruments from the National Waste Management Plan, 2001

The instruments applied in Austria under the *National Federal Waste Management Plan* may be categorised as follows:

- Legal and organisational measures as well as preparation and compilation of the necessary expert documentation.
- Public awareness and information campaigns as well as consultation and training.
- Exemplary action by public authorities .
- International co-operation (in particular within the EU).
- Market economy instruments and financial incentives .

Specifically, the following measures and instruments are being applied in order to prevent waste:

Sector Specific Guidelines: In the past few years, numerous sector-specific guidelines have been developed in Austria for the purpose of describing and quantifying the potential for the prevention and recovery of waste generated in various sectors of industry and at various stages of production. Primary consideration was given to those types of waste which occur in large quantities or, due to their constituent substances, represented a relatively high hazardous potential.

The majority of these intra-industrial guidelines were drawn up in co-operation between the Federal Ministry of Agriculture and Forestry, Environment and Water Management and the Austrian Federal Economic Chamber as well as the respective trade organisations (Institute of Economic Development – WIFI, trade associations, guilds). They are to offer assistance and suggestions to companies concerned and also are to serve as a basis for decision-making in the field of environmental subsidy measures under the Environmental Subsidy Act. Currently, sector-specific guidelines are available for the following industries:

- wood and timber
- agriculture
- medical waste
- paint and lacquer waste
- non-halogenated solvent waste
- waste from leather-processing enterprises
- foundry waste
- waste from food production
- dry cleaning
- metal-surface cleaning using chlorinated hydro-carbons
- cellulose/pulp and paper industry
- textiles (two-part guideline for waste and sewage)
- photographic waste and sewage
- waste oils and waste lubricants
- electroplating
- chemical industry

Waste Management Plans: The Waste Management Act and the Trade Regulation Act require operators of older plants to draw up a waste management plan if waste is generated in the course of operation of the plant and if more than 100 persons were employed at the plant as of the effective date 1 July 1990 (or at a later date). By the same token, such a plan must be enclosed in applications for the licensing of new plants and/or the modification of older plants.

A waste management plan is to provide an overview of the type and quantity of the waste generated at the plant as well as to highlight possibilities for effective waste prevention and recovery. Substance and material flows must be accounted for, and optimisation options must be identified.

Waste management plans should also contain material and substance balances – at least for those pollutants and recoverable substances for which the company is a key forwarder, transformer or warehouse-keeper in the context of Austria's waste management system. Sector-specific and waste management plans offer the best possibility of using substance and material flow analyses.

Material and substance flow analyses facilitate taking correct, efficient decisions concerning the prevention, recovery and environmentally friendly disposal of waste.

Environmental impact declarations, too, must contain material and substance balances. Only balances that link the waste input to the output by means of transfer coefficients allow a detailed verification of emission prognoses und the recommendation of necessary measures, if so required. This may entail direct advantages, such as possible cuts in disposal costs and greater certainty concerning the observance of legal provisions. Such information also builds up a climate of trust when cooperating with public authorities.

To be able to make full use of these opportunities, it is important to update waste management plans in order to monitor the waste management situation regularly, verify the effects of steps taken, identify changes and derive new measures from them.

Waste Officers: Since 1 October 1995, it has been mandatory for all companies in Austria with 100 or more employees to appoint a qualified waste officer and a deputy in writing and to report their names to the authorities. This is a requirement under Art. 9 (6) of the Waste Management Act.

The duties of the waste officer include monitoring of compliance with the stipulations of the Waste Management Act and the related administrative activities as well as informing the company owner of his/her findings, in particular concerning identified problems. Moreover, the waste officer is required to develop proposals to eliminate shortcomings. He/she must work towards the implementation of waste prevention measures and the effective organisation of waste separation, waste recovery and waste control systems as well as towards the implementation of all provisions under waste management legislation affecting the company.

Eco-Audit (EMAS Regulation): Council Regulation (EEC) No. 1836/93 of 29 June 1993 allowing voluntary participation by companies in the industrial sector in a Community eco-management and audit scheme (the EMAS Regulation) also came into force in Austria in 1995. The accompanying national provisions necessary for the application of the Regulation were set out in the Federal Act on the accreditation and supervision of environmental auditors as well as to the maintenance of a list of sites (UGStVG). On 24 April 2001, the revised EMAS-V Regulation (No. 761/2001) was published in the EU's Official Journal (L 114); it entered into force on 27 April 2001.

The Federal Ministry of Agriculture and Forestry, Environment and Water Management and the Federal Ministry of Economic Affairs and Labour have created the basis for the implementation of the eco-audit system in Austria, thus taking another step towards sustainable and environmentally sound development, emphasising in particular the importance of further development of environmental protection in the industrial sector.

Since the Ordinance on the definition of additional sectors to which the provisions of the EMAS Regulation and the UGStVG will be applied on the experimental basis (Sector Extension Ordinance), other enterprises in the transport and banking sectors that are not covered by the EMAS Regulation were also temporarily allowed to participate in the system.

At present, more than 300 sites in Austria have been certified to EMAS. It is now planned to transform the Federal Act pertaining to the accreditation and supervision of environmental verifiers as well as to the maintenance of a list of sites into an updated waste environmental management act that meets the latest findings in the field of eco-auditing.

Voluntary Agreements: Several voluntary agreements between industrial sectors and authorities are in place in Austria. These include agreements regarding old tyres; PVC-containing window frame casements and synthetic pipes; packaging; and end-of-life vehicles.

Public procurement of environmentally friendly products: Article 6 of the Waste Management Act states that the Federal Republic should primarily purchase products which, following their use or consumption, will cause the minimum possible impact on the environment as waste. In addition, consideration must also be given to the principles of cost-efficiency, economy and expediency.

Austria's procurement legislation, too, integrates numerous ecological approaches of relevance for waste management. For example, for purchases by the Federal Republic below certain minimum thresholds, the Austrian standard ÖNORM A 2050 is applied; this standard stipulates that "the awarding procedure must take account of the ecological impact of the service rendered/product purchased".

Moreover, the specification of each service or product must integrate "criteria for the delivery of environmentally friendly products or for the rendering of services performed according to environmentally sound processes". In addition, the Federal Act on the Awarding of Contracts prescribes the incorporation of ecological aspects into the awarding procedures.

Training: The information activities of eco-consultants and waste consultants are considered of crucial importance for the spread of the required knowledge base in Austria. Especially with regard to the on-site implementation of waste management measures, eco-consultants and waste consultants are considered indispensable.

For waste officers, training courses are organised by numerous institutions. Depending on the type of landfill concerned, the Landfill Ordinance lays down specific training requirements for landfill personnel, above all for the heads of the department inspecting incoming wastes. The Austrian Water and Waste Management Association (ÖWAV) has published a form sheet on the job specifications for heads of these departments as well as for monitoring personnel (ÖWAV-Regelblatt 504) and also organises courses in this field.

The ÖWAV form sheet 507 (ÖWAV-Regelblatt 507) on the Training of the Operational Staff of Waste Treatment Plants was recently published as well to bring the qualification level of the operational staff of waste treatment plants up to the latest technological standards.

Information and public awareness: The Federal Ministry of Agriculture and Forestry, Environment and Water Management supports activities promoting uniform information of the public throughout Austria, in particular with respect to waste prevention and the separate collection and recovery of waste. In addition, the following activities were carried out relating to:

- Biogenous waste: Biogenous waste accounts for 30% of the waste generated in households. As a first step towards the development of a material cycle for biogenous waste, the Ordinance on the separate collection of biogenous waste came into force on 1 January 1995. At the national and regional levels, such issues as "compost" and "composting" were largely covered by information material, in particular for households. The demand for specific information material specially prepared for individual target groups was taken as an occasion to provide uniform material on biogenous waste for the entire Federal Republic to inform the target groups "schools", "multipliers" (municipalities, associations) and "food trade". In order to encourage preliminary collection in the household, biogenous-waste sacks were distributed throughout Austria in co-operation with the Austrian waste management associations. Demand shows that the behaviour and awareness of citizens to collect household waste separately are very strongly developed.
- Specialised information on key issues for a better informed public: Additional information work is done by the Federal Ministry of Agriculture and Forestry, Environment and Water Management with its project "Communication Network for Eco-Consultants", which was specially designed to support the activities of eco-consultants

and waste consultants. Events organised twice a year are to strengthen the professional image of waste consultants on the one hand and present and discuss current issues and developments or changes on the other hand.

- Exhibition "entSORGEN": In order to encourage Austrians to ask themselves crucial questions such as "What can I do to avoid hazardous household waste?", "What are the alternatives?" and to motivate them to act accordingly, the Federal Ministry of Agriculture and Forestry, Environment and Water Management has prepared a travelling exhibition on hazardous household waste entitled "entSORGEN".

Environmental subsidies: The objective of federal environmental funding is the lasting improvement of the environmental situation in Austria. It has a supporting function among the various instruments of prevention-oriented environmental policy and it is also used to influence investment decisions in an environmentally friendly and resource-conserving manner while at the same time increasing the rate of economic and technological innovation. With the Environmental Subsidy Act 1993, duties that previously had been under the aegis of the Environment and Water Management Fund were placed on a new legal basis.

One of a total of four subsidy objectives is concerned with environmental protection by minimizing contamination in the form of air pollution, pollutants of relevance for the climate, noise (with the exception of traffic noise) and waste; it is entitled "Environmental Subsidies in Austria".

Since 1 April 1993, Kommunalkredit Austria AG has been handling environmental subsidy issues. Funding in the waste sector aims at promoting the use of technologies for the prevention and recovery of hazardous waste within companies. Process conversion and pilot projects are granted particularly high subsidies. Prevention and recovery measures to reduce the volume of non-hazardous waste can only be funded within the context of pilot projects. Furthermore, it is considered necessary to include, for a limited period of time, projects aimed at the quickest possible implementation of waste-law frame conditions with significance for the general environmental strategy, such as the establishment of suitable waste treatment plants in keeping with the requirements of the Landfill Ordinance.

As expected, the trend towards a decrease in the number of waste prevention and waste recovery projects submitted for funding, which began in the early 1990s, has continued. A still greater number of projects has been reported for 1996 and 1997; this is due to the fact that these projects were submitted under a different classification and also meet other legal requirements.

Regulatory measures including ordinances from the Waste Management Act

Several legislative-based measures have been implemented in Austria with the aim of reducing waste and using materials in a more environmentally friendly manner. These may be broadly separated into system related measures, product related measures and plant related measures (state of the art).

1. *System related measures:* Several system related measures have been implemented in Austria under the Waste Management Act in relating to, for example:
    - Amendments to the Waste Management Act concerning landfills including implementation of the IPPC Directive, an integrative approach, updating of requirements, public participation, European pollutant emission register (EPER), implementation of Seveso II, obligations of the operator, tasks of the authority, streamlining of landfill legislation, ban on surface depositing of hazardous waste, procedural provisions for landfills, mandatory treatment of waste at landfills etc.
    - General reforms of waste legislation including changes in objectives towards sustainability, conservation of resources, simplification on the basis of evaluation,

streamlining of legal provisions relating to plants, avoidance of overlaps and conformity with EU law. Focal issues of these general reforms include greater emphasis on the conservation of resources, qualitative waste prevention, increased use of recycled materials, quality standards for waste treatment, reformulation of the frame conditions for systems, harmonisation, waste balances and statistics, and the consequences of EU law.

- Hazardous waste issues.
- Waste data compilation.
- Waste shipment.
- Waste control and inspection measures.
- Basel Convention.
- OECD.
- Reporting obligations in the European Union.
- Other relevant EU legislation.

2. *Measures related to products and wastes* including specific measures relating to:

- **Demolition waste and excavated soil**: The potential mass of demolition waste and excavated soil is estimated to total almost 27.5 million tonnes per annum in Austria. Thus, this group accounts for around 57% of the total waste volume of approximately 48.6 million tonnes generated per year. The share of mineral demolition and construction waste included in the total waste volume can be placed at around 7.5 million tonnes per year. Thus about 20 million tonnes of excavated soil arises per annum.

  The Waste Classification Ordinance 1997 introduced quality assurance measures for soil excavated at potentially contaminated sites in the form of preliminary investigations and examinations for exemptions. With regard to the utilisation of excavated soil as fill material, the Association of Construction Industry made a first step towards comprehensive quality control in this field by preparing a code of practice on the utilisation of soil as fill material.

  A working group established by the Federal Ministry of Agriculture and Forestry, Environment and Water Management performed further basic work on general principles that define rules for the utilisation of excavated soil both for backfilling and the production of re-cultivation layers. These utilisation principles to be included in the Supplement to the Federal Waste Management Plan include quality criteria for excavated soil and the basic requirements to be met by utilisation.

  Separately collected demolition waste may be treated either on site or in treatment plants. The significant increase in the treatment of mineral construction waste from 1994 is due to new applications for recycled construction materials in accordance with the guidelines for construction materials recycled from building demolition waste issued by the Austrian Association for Construction Materials (ÖBRV). Asphalt is increasingly recycled by asphalt hobbing on site. Only small quantities of asphalt are still landfilled. The recycling rate of road demolition waste is around 80%.

  The Ordinance on the separate collection of waste generated by construction activities (Federal Gazette 1991/259), which entered into force on 1 January 1993, stipulates that, if certain quantitative thresholds are exceeded, different waste categories have to be collected separately (mineral construction debris, excavated soil, broken-up concrete, torn-up asphalt, wood, metal, synthetic and construction waste).

- **Packaging**: In order to meet the requirements of *Directive 94/62/EC on packaging and packaging waste***,** Austria has put several Ordinances into place. These ordinances are explained in detail elsewhere (Coakley *et al.*, 2002), and their effects are impressive from a recovery perspective. In the year 2000 The Packaging Target Ordinance set new targets, combining the following requirements:
  - Re-filling or recovery rate of 80% for the packaging of all types of beverages from 2001.
  - Maximum remaining quantities of other packaging that may be landfilled from 2001.
  - Recycling rates corresponding to the Packaging Ordinance in relation to the total quantity of each packaging material on the market.

  Thus this ordinance combines the previously separate rates for different types of beverages and stipulates an overall rate of 80% - this means less calculation by type, less administrative commitments and better data arising. At the same time the beverage industry and trade voluntarily committed, *inter alia*, to the maintenance of existing re-usable packaging systems (in particular glass) – thus preventing waste.

  As well as leading to high levels of recovery and reuse (household packaging waste reduced by over 50% from 1991 – 1998; industrial bulk packaging reduced by 80% from 1991 – 1998), these packaging regulations have also given substantial impetus to preventive measures. In a general perspective, trends have changed insofar as the packaging quantity no longer increases at the same rate as the GDP in real terms. The input of primary raw materials for packaging stagnates due to a rise in recycling.

  Large quantities could be saved by the increased use of re-usable transport packaging, in particular in the corporate sector. The optimisation of packaging also allows for a reduction of the consumption of primary raw materials. In total, packaging performance (material used per product unit, i.e. per service) improved significantly due to these Ordinances.
- **WEEE**: In order to meet the requirements of the Directive of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE) Austria plans to implement a comprehensive WEEE collection and recovery system. For reasons of practicality, control, reflection of true costs, cost efficiency and fairness, a system of burden sharing was felt to be desirable. To this effect, future considerations on systems should give special attention to parallel goods and financial flows, i.e. those responsible for a specific step in the logistics chain should also be responsible for funding.

  This means that all the parties involved have to bear part of the responsibility and costs:
  - Manufacturers are responsible for recovery and environmentally sound treatment of WEEE as well as for environmental-friendly and recycling-friendly product design.
  - Retailers are responsible for advising consumers on ecological aspects when they buy a device and for taking back WEEE when new equipment is bought (1:1 take-back obligation).
  - Final consumers of electric and electronic equipment are responsible for handing over WEEE to the collection system. They ultimately bear the costs of WEEE collection and treatment, either directly or indirectly through various systems (e.g. sales price, municipal waste charge).

- Municipalities or their waste management organisations are responsible for ensuring collection close to the consumers as well as for informing and advising the population.
- Recovery/disposal operators are responsible for environmentally sound recovery and disposal of WEEE in line with legislation.

To facilitate the main objective of this directive, the elimination of pollutants from entering the biosphere, a number of guidelines have been developed by the The Federal Ministry of Agriculture and Forestry, Environment and Water Management such as: "Guidelines on the collection and treatment of electrical and electronic appliances"; "Recycling and disposal of electrical and electronic appliances" and "Requirements to be met by firms collecting and treating electrical and electronic equipment."

As well as the recovery element of the Directive, plans are also in place to allow for qualitative preventive actions, for example from January 2008 the substitution of lead, mercury, cadmium, hexavalent chromium, certain brominated flame retardants in electrical and electronic equipment by other less harmful substances.

Already in Austria, ordinances have been put in place to allow for the take back of refrigeration equipment, using a voucher scheme given to consumers at purchase. Another ordinance controls the labelling, take back, and deposit system for certain lamps. A number of ordinances are also in place for the take back and limiting of pollutant content of certain batteries and accumulators.

- **Biogenous waste**: The Austrian Ordinance on the separate collection of biogenous wastes (Biogenous Waste Ordinance, Federal Gazette 1992/68), which entered into force on 1 January 2001, stipulates that these wastes have to be collected separately unless they are re-covered (composted) directly at households or establishments. The amount of biogenous waste collected in municipal bio-waste containers was raised from 182,000 tonnes in 1993 to approximately 478,000 tonnes in 1999. The amount collected per capita (through bio-waste containers) reached an average of around 60 kg in Austria. This corresponds to a coverage of around 65% for collection through bio-waste containers with regard to the share of biogenous wastes from households and similar establishments (745,000 tonnes).

  Furthermore, biogenous (organic) material is recovered by private composting. Its quantity is assumed to exceed 500,000 tonnes in 2001. Thus, when taking into account private composting, the coverage and recovery level for biogenous material is significantly higher. In part, garden waste from allotment gardens and private homes (e.g. bulky tree and brush cuttings) is collected through other systems (shredder service, direct delivery to treatment plants or waste collection centres) rather than bio-waste containers, and thus is included in other municipal wastes.

  The volume collected in regions which introduced bio-waste containers some time ago shows that the long-term target of 80% coverage (of biogenous wastes from households and similar establishments) can certainly be achieved under optimum framework conditions at a regional level.

5. Belgium (Flanders)

Sector-based Implementation Plans

As stated in Section 5.4 of the Main Report, a number of sector-based implementation plans have been undertaken or are planned for Flanders. Here follows a brief overview of these plans – the actual instruments and measures being implemented will be discussed in more detail further below (OVAM, 2001b). The current sectoral plans in place are as follows:

Implementation Plan for Construction and Demolition Waste (approved on 05.04.1995)

According to the terms of reference of this plan, the quantity of construction and demolition waste should be reduced as much as possible by means of prevention. The actual volume of construction waste will be reduced by 25% in the medium to long term. Sufficient data is lacking for the time being to forecast a figure for demolition waste. The quality and composition of construction and demolition waste produced will also be improved, in the sense that more and higher-grade useful applications can be achieved. Furthermore, if incineration or landfill disposal is necessary, there will be fewer environmental problems.

The following actions have been developed to meet these objectives :

- Influence of all players involved to reduce the quantity of construction waste on construction sites.
- Reduction of the quantity of demolition waste by means of life-span extension.
- Promotion of the use of environmentally-friendly building materials and products.
- Prevention manuals for general construction, road-building, painters, carpenters, marble and stone workers (e.g. by "Presti-programma" - prevention stimulating programme (see below)).

With regard to waste *sorting*, at least 85% of the construction and demolition waste stream must be separated before being offered to treatment companies in the year 2000. The following actions have been formulated for this purpose:

- Optimisation of separation and management at source.
- Introduction of environmental regulations for construction and demolition activities.
- Optimisation of transport to treatment companies.
- Limitation of illegal disposal and low-grade use of debris.
- Improvement of landfill site management.

The target for treatment is that of the 85% of construction and demolition waste available for treatment, at least 75% is applied usefully and at most 10%, namely household refuse from treatment, goes to landfill. The most important action is the promotion of research into the useful application of materials and components from construction and demolition waste.

With respect to sales, sufficient sales capacity should be achieved for all secondary raw materials processed from construction and demolition waste. Existing markets should be strengthened or expanded. New markets should be created and exploited. Four actions have been developed to meet these objectives:

- Quality assurance by means of a quality monitoring system.
- Quality improvement through technical and scientific research.
- Support through market studies into application possibilities for secondary raw materials from construction and demolition waste.
- Opening up of market segments for secondary raw materials from construction and demolition waste.

Preventive measures, separate demolition and sorting are becoming increasingly important because of:

- The prohibition on landfill disposal of among other things unsorted industrial waste.

- The cost of treating or disposing of unsorted waste.

Implementation Plan for Biological Waste (implemented 21.01.2000)

While this plan is still at an early stage and definitive results are not yet apparent, through concrete projects and result-oriented actions it is hoped that the processing hierarchy can be maintained. A distinction is made between landscape refuse and vegetable, fruit and garden waste (with emphasis on prevention and processing) on the one hand and biological industrial waste on the other hand (with emphasis on high-quality useful applications as fertilizer or soil conditioner). Recently, a new trend emerged with regard to biological waste: the Lansink ladder (waste hierarchy) is no longer absolute because of the developments in other policy domains such as food safety, for example (after the crises in the food industry), which aim at absolute precaution and nil risk.

Implementation Plan for Household Refuse 1997-2001 (approved on 19.12.1997 and renewed until December 2002)

Household waste is a priority source of waste in Flanders and several measures are being used to prevent and recover household waste streams. These are discussed in further detail below. Many of these instruments are dependent upon the municipal environmental covenants system used in Flanders, again which is described in detail below.

Implementation Plan for the Separated Collection of Industrial Waste in Small Enterprises (approved on 28.01.2000)

According to the Flemish regulation concerning Waste Prevention and Management (VLAREA) more waste products will be categorised as industrial waste instead of household waste in Flanders. This implies that from now on SMEs will have to organise their own separated waste collection system. Considering their limited waste production, it is not always easy to set up an efficient and cost-effective collection system. Therefore easy access will be granted to collection infrastructures. For specific industry-oriented waste products this entails collections per sector. For the waste products similar to household waste the municipality can offer assistance, local cooperation agreements between SMEs can be concluded or waste products can be gathered to increase the waste volume and this by means of return freights. It is intended that this plan would encourage initiatives by all parties concerned.

The following sectoral based plans are in the planning stage:

- *Implementation Plan for High-Calorie Waste* (see Strategic Waste Plan below).
- *Implementation Plan for Shipping Waste; the ECOWARE project (waste management system and plan for the Flemish seaports),* launched in 1998 and supported by the European LIFE programme, aimed at the development of a logistic and information system for the automation of shipping waste management and monitoring in the Flemish seaports. The progress made within the scope of this project allows us to smoothly implement the new Directive, 2000/59/EG of 27.11.2000, with regard to the receipt of shipping waste and loading residues.
- *Implementation Plan for Sludge:* in implementation of Action 57 of the Implementation Plan for Biological Waste, the preparations for a sludge implementation plan started in 2000. The goal was to find solutions for the deposit of sludge from wastewater purification plants (according to VLAREA, this can no longer be used on farmland as of December 1st, 1999) and other purification sludge from drinking-water production and sewage cleaning.

- *The Plan for Wood Waste* aims at an analysis of the present situation with regard to prevention, separated collection and processing. Next, the analysis results are compared to the objectives of the waste, energy and product policies. This comparison will result in initiatives for wood waste stream control in the various industries. Prevention will play an important role, quantitatively as well as qualitatively (process and product policy), resulting in a reduction of the effects on the environment caused by the various methods of useful application and disposal.
- Within the scope of Action 57 of the Implementation Plan for Biological Waste, a sectoral *Dredging Spoils Plan* will be drawn up, in which an in-depth overview is given of the present situation and a solution strategy developed.

Other plans include the following:

- *The Interregional Cooperation Agreement for Packaging Waste* obliges packaging managers, who pack goods in Belgium using more than 10 tons of packaging material per year, to submit a three-yearly general prevention plan as of March 5th, 1998. This *prevention plan* includes measures and quantitative objectives to market less non-recyclable packaging material and more reusable and recyclable packaging materials and to increase their environmental-friendliness by improving their physical and chemical properties. Within the scope of this agreement the Fost Plus (for municipal packaging waste) and Val-I-Pac (for industrial packaging waste) projects were launched. The results obtained by these organisations exceed the predefined collection and recycling percentages and are among the best results in Europe. In the near future the agreement will be modified, to include higher collection objectives.
- *PCB Plan*. On May 17th 2000 the resolution of the Flemish government of March 17th 2000 was published with regard to the disposal plan for appliances containing PCBs and the PCBs contained. The plan also came into force on that same date.
- The development of a new *Implementation Plan for Construction and Demolition Waste.*
- In the *Strategic Plan for Final Disposal,* policy lines will be defined with regard to the processing of waste streams that are not considered for recycling. A large part of these waste streams contain high-calorie wastes, for which a High-calorie Waste Plan will be drawn up, in which the supply of these waste products will be determined as well as the processing capacity and options.

The Long Term Vision: Strategic Plan: approved in May 2001, outlines the scope of the waste policy for Flanders for the years 2002-2006, with a view to 2010. The starting point for the development of this plan was a set of 4 planning objectives:

- The production of waste and the effects thereof on the environment can no longer increase.
- Raw materials and energy are replaced by waste products.
- The overall volume of waste to be dumped or incinerated is limited in an ecologically sound way.
- The effectiveness of the waste policy is increased.

These objectives resulted in six projects that are interrelated:

- A process and product policy aimed at waste prevention (Strategic Waste Prevention Project).
- The analysis of and systematic approach to priority industrial waste (Priority Industrial Waste Project).
- The development and implementation of an Implementation Plan for Household Waste 2003-2007.

- An analysis of and systematic approach to high-calorie waste (High-Calorie Waste Project).
- An extension of the international basis for the Flemish waste policy.
- An increase of waste policy effectiveness by optimal monitoring and maintenance.

Instruments

The following section describes measures and instruments being applied in Flanders and other regions (Wallonia, Brussels, Denmark, Germany, Italy, Luxembourg, Netherlands, Sweden, Spain and the UK) in a comparison or benchmarking study carried out by OVAM (Flemish Public Waste Agency) in 1999 (OVAM, 1999a). The purpose of the study was to compare the application of these measures in order to be able to make Flemish waste management more effective. The study primarily concentrates on measures to prevent and manage household waste since there was little comparative quantitative data on industrial waste in the regions covered. In fact one of the main findings of the study was that "Recent and reliable figures for industrial waste are disappointingly scarce in different countries and regions. This is remarkable since the total stream of industrial waste is considerably greater and also potentially more hazardous for the environment than the municipal waste stream."

1. Measures for the prevention and recovery of municipal waste

Differential charging for household refuse: If the tax on household refuse and bulky waste is linked to the quantity and nature of the waste that is offered, this instrument has a regulatory as well as a financial effect. The citizen is rewarded for good waste management. Differential charging can mean a charging system based on the volume or the weight of the waste proffered. Charging based on waste volume is achieved among other things by offering dustbin bags at certain prices, whereby dustbin bags for recyclable fractions, such as vegetable, fruit and garden (VFG) and plastic, metal containers and drinking cartons (PMD) waste, are cheaper than those for household refuse.

Flanders is one of those countries/regions where this instrument has already been applied for some considerable time, since 1991. In addition, more than 50% of the municipalities were using this instrument in 1999 in order to promote separate collection and consequently to reduce the quantity of household refuse.

Estimates of the coverage of this instrument (1999 situation) are known for four countries/regions:

- Flanders : more than 50% of municipalities;
- Brussels : 14% of municipalities;
- The Netherlands : 22% of municipalities[3];
- France : less than 10% of municipalities;
- Luxembourg : 4% of municipalities.

In addition, the Flemish government formulates recommendations for the municipalities to adopt a uniform charging system. This is intended to avoid illegal dumping in neighbouring municipalities.

In 1998 OVAM carried out research into the effect of taxes and charges on the generation of household waste. The study concluded that a variable tax on the amount of municipal waste would work to reduce waste arisings. For example, introducing a tax of BEF[4]1,214 (€30) per annum, was predicted to result in an average decrease of 30 kg per inhabitant per annum.

[3]In The Netherlands, 58% of municipalities levy a tax on household refuse, which is calculated on the basis of the number of persons in a household.

[4] Belgian Francs (BEF1 = € 0.0247894)

A variable tax was also expected to yield a significant increase in the amount of recyclables recovered in selective household collection. Consequently, charges are believed to be a suitable instrument to affect the behaviour of householders. However, sometimes municipal waste taxes may be perceived to be a licence to pollute. Systems with a multi-stage pricing (which reward prevention more highly than simply sorting household) give even more beneficial results. The general conditions for a system of tariff differentiation were found to be:

- Variable charges on household refuse, bulky items and selective collection.
- The basis for determining the level of charges is the costs of waste collection and management.
- A decision must be made as to whether the charges are to be full or partial.
- The fixed municipal waste tax is also an important element in the financing of waste.
- The portion of charges financing waste collection and management may still increase, while the share of fixed taxes may decrease.
- The consumer needs significant signals (price and behaviour) to stimulate prevention.
- Social adjustments to the charges should rely on only one criterion - income. Using the net taxable income of a family as a basis for setting charges means that low income families will be charged less.
- Supportive measures, such as selective collection and information campaigns are needed to restrict illegal behaviour after the introduction of a variable charging system.

The objective was to develop a financing model for municipal waste management, combining charges and semi-fixed taxes that reduce illegal behaviour and stimulate waste reduction.

In 1998 OVAM studied the 308 Flanders municipalities, to evaluate the systems of taxes and charges. 267 municipalities charged householders a fixed tax, while in 73 municipalities a fixed anti-pollution tax (including waste and water) was levied. 202 municipalities had a fixed tax exclusively for household waste. The average annual tax was between BEF1,947 (€48.26) and BEF2,428 (€60.28), if social adjustments are taken into account.

In 1999, 102 municipalities introduced a combination of fixed and variable taxes. Fixed anti-pollution tax: minimum: BEF1,947 (€48.26), maximum: BEF2,860 (€70.89). Fixed municipal waste tax: minimum: BEF1,611 (€39.93), maximum: BEF2,428 (€60.18)

The most common social corrections used by municipalities were:

- number of members in a family (113 municipalities)
- widows, orphans, handicapped people (84 municipalities)
- family income (51 municipalities).

The study also gave an overlook of the tools used to collect the municipal waste:

- 261 municipalities used sacks
- 24 municipalities used containers
- 21 municipalities used a combination of both.

Eco-teams: Eco-teams exist only in Flanders and The Netherlands. Setting up Eco-teams encourages people to arrange their lives in a more environmentally-friendly way. Continually recurring themes include prevention of household refuse and improving separate collection.

At the end of 1998, 1,187 Eco-teams were or had been active in The Netherlands, reaching about 8,350 households. In Flanders, more than 165 Eco-teams were or had been active, which corresponds to about 1,155 households. Eco-team coverage in The Netherlands is three times higher than that in Flanders.

Take-back duty for packaging waste: The separate collection of packaging waste is co-ordinated and stimulated by a recognised organisation in a number of countries and regions, including Flanders. These organisations have set up in a number of countries by packaging manufacturers and suppliers in response to the take-back duty for packaging materials which they market.

In Flanders there was a 63% increase from 1995 - 1997 in the quantity of paper and cardboard collected per inhabitant. This is primarily due to many municipalities switching to monthly door-to-door collection of packaging waste. Research shows that paper and cardboard account for over 50% of packaging waste.

Reusable plastic packaging: Returnable plastic packaging is used on a large scale in some countries, e.g. in The Netherlands. Of course, fewer glass bottles will be used in those countries where returnable plastic bottles are prevalent.

Higher charges for landfill disposal and incineration: As far as data is available, the indicators show that those countries with low charges for incineration and landfill such as France and Wallonia, have a large fraction of waste for disposal. Conversely, Flanders, The Netherlands and Luxembourg have introduced high charges and appear to produce smaller quantities of waste for disposal. This becomes clearer if the construction and demolition fraction is included, since more of this stream is recycled.

No data on charges for landfill and incineration was available for the other countries.

Separate door-to-door collection ('collect'): Door-to-door collection of paper/cardboard, VFG and packaging waste is carried out in more than 50% of Flemish municipalities. In Wallonia, France and Luxembourg, less than 10% of municipalities perform door-to-door collections of these fractions.

Paper and cardboard were collected in 100% of municipalities in Flanders (1997) and The Netherlands (1996). A combined 'bring' and 'collect' system was used by 90% of municipalities in The Netherlands and by 51% in Flanders, while 10% and 12% respectively used only the 'bring' system. In The Netherlands, 37% of municipalities likewise use only door-to-door collection.

For glass, there are high collection levels in Flanders and The Netherlands due to the collection system combined with the density of bring facilities. In 1996, about 98% of municipalities in The Netherlands employed bottle banks in combination with door-to-door collection in 50% of these municipalities. The remaining 2% used door-to-door collection.

In 1997, 100% of municipalities in Flanders used the 'bring' system, combined with door-to-door collection in about 13%. In The Netherlands and Flanders, the average collection facility density in 1996 was one bottle bank per 727 and 1,000 inhabitants respectively.

Separate collection via container parks ('bring'): In 1990, France had more than 230,000 inhabitants per container park, however by 1996, this had been reduced to one park per 40,000 people. In Luxembourg, by 1996 there was one container park for about 30,000 inhabitants, In Brussels there are more than 300,000 inhabitants per container park, even by 1999 while in both Flanders and Walloon, there is one container park for every 20,000 citizens.

Separate mandatory collection for VFG waste: Compared with other countries and regions, the largest quantity of separately collected waste is in The Netherlands (98%). This can be largely explained by the fact that a separate mandatory collection for VFG waste came into force for

municipalities in 1993. Door-to-door collection of VFG waste takes place in almost 80% of municipalities on fortnightly basis. 7% of these municipalities switch to once-weekly collection in the summer months. Research shows that smaller municipalities collect more VFG waste on average than larger municipalities. The collection methods are used are special VFG containers/buckets, duobins (containers featuring a compartment for VFG waste and a compartment for unsorted house refuse), and plastic bags in a number of municipalities.

Stimulation of home composting: In Flanders there is an annual increase in the share of VFG waste which is processed via home composting. Considerable efforts have been made in Flanders in this respect, namely public campaigns on home composting, training of compost experts, subsidies for the purchase of composting bins, etc. Home composting is stimulated on a small scale in a number of European countries, including The Netherlands. The quantity of separately collected VFG waste may be expected to fall if home composting is applied on a large scale.

Separate collection for hazardous household waste (HHW): The Scandinavian countries started with the separate collection of HHW in the early 1980s. This also explains the high level of separate collection in Sweden, which was the same as Denmark and Luxembourg in 1994.

In Luxembourg, separate collection is largely in the hands of a private company. In 1997, 61% of collection was via container parks, 32% via mobile units and 7% door-to-door. Separate collection via a mobile "chemocar" is widespread in almost 90% of municipalities since only 14 of the latter have a container park. The company's "chemocar" visits every town or village four times a year and the container is accessible throughout the visit. The municipality notifies every resident in advance in writing when the "chemocar" is due. There is also a door-to-door collection in some municipalities, or the "chemocar" is available on demand in certain cases.

This private company organises public awareness campaigns at village fêtes and other activities. The company also pays a great deal of attention to young people, who can participate in playful actions and campaigns during school hours. It is noteworthy that all the company's employees receive training about HHW so that they can provide residents with adequate information, for example on prevention (use of rechargeable batteries, minimum use of aerosol cans, etc.).

Table A.2 shows an overview of these instruments for promoting prevention (P) and recycling (R) of municipal waste.

Table A.2. Instruments for prevention and recycling in 10 regions

	Instrument and/or action	Fla	Wal	Bru	Dnk	Ger	Fra	Ita	Lux	Neth	Swe
P[5]	Stimulating home composting	91		98	X	X		97	80	X	
P/R	Eco-tax on non-returnable articles, drinking packaging	93	93	93	89	93		88			X
P/R	Municipal environmental covenants	92									
P/R	Differential charging	91	95	X	90		98	00	94	92	
P/R	Eco-teams	95		99						X	
P/R	Packaging : Covenant	91	92	97	X	91	93	97		91	X
R	Packaging: Take-back duty/duty of acceptance	97	97	97		91		97	99	X	X
R	Packaging: Organisation for packaging-waste collection	94	95	94		X	93		X	X	
R	High charges for landfill/incineration[6]	96	99		93				92	X	99
R	Door-to-door collection of paper waste	91	X	92	X	X	X	97	< 84	X	
R	Door-to-door collection of glass waste	91	X	X	X		X	94	< 84	X	
R	Door-to-door collection of VFG waste	91	X	01	X	X	X	97	89	93	
R	Door-to-door collection of packaging waste[7]	94	X	98			X		97		
R	Container park	81	X	< 92		X	< 90	94	< 84	X	X

2. Measures for the prevention of industrial and commercial waste:

The support for industry in Flanders regarding environmental improvement began in earnest from 1990 - 1994 when a series of pilot projects were undertaken. In 1994 the first subsidy programme *PRESTI* (PREvention STImulating) was implemented by the Flemish Government. Presti 1: 1994 – 1997 concentrated on the gathering and distribution of sector information (analyses of potential). Presti 2: 1997 – 2001 was more focused on the demonstration of measures in companies through federations. Presti 3: 1997 – 2002 provided subsidies for individual companies. Presti 4: 1998 – 2006 provides subsidies for 5 intermediary organisations to stimulate companies (who in their turn get to use an environmental logo). Presti 5 is to be implemented from 2002.

In 1998 an analysis of the situation concerning prevention (in industry and households) was undertaken because while several actions and programmes under Presti had taken place, it was felt that the information gained from these experiences was not being widely disseminated and used elsewhere and the initiatives had not been sufficiently co-ordinated.

This analysis led to the government's development of an information based support scheme called STIP (STeunpunt en Informatiecentrum voor Preventie van afval en emissies) translated as: *an information and knowledge centre specialised in waste and emission prevention* which was begun on June 28th, 2000.

STIP aims at disseminating the results of the previous projects carried out in Flanders as well as using the wide spread of knowledge on Cleaner Production available from other international sources. STIP provides knowledge and expertise to a spread of target groups such as: industrial

[5] P indicates prevention based; R indicates recycling based, X indicates year of implementation not known, numbers indicate year of implementation

[6] For high charges for landfill/incineration the lower limit is taken as 1,000 BEF (€24.78)/tonne unsorted municipal waste.

[7] Door-to-door collection of packaging waste generally comprises plastic and metal containers and drinking carton waste (PMD waste).

federations, chambers of commerce, local authorities, environmental organisations, schools, NGOs etc.

By the end of 2001 STIP had 5 full-time staff with a variety of expertise. It was led by a board of representatives of the four authorities in Flanders and situated within one of them (that with responsibility for soil and waste).

STIP provides information via its websites (www.stip.info and www.milieuwinst.be) as well as via publications, a newsletter and helpdesk. It is also involved in network development through organisation meeting and symposia for the dissemination of knowledge and mutually supportive and self-sustaining networks in the region.

Much of the knowledge-base development for environmental protection in Flanders is done through Vito, the Flemish institute for technological research. Vito is an independent research centre, where the latest technologies and practical applications for environmental protection are investigated, developed and disseminated. Vito conducts customer oriented contract research and develops innovative products and processes in the fields of energy, environment and materials, for both the public and the private sector. With a staff of 478 people by 2001, Vito carries out private R&D and support work for individual companies, but also supports many of the policies of the government, including the development of strategies, plans and programmes. Vito is central to several of the information and support initiatives that the Flemish government feels are necessary to promote sustainable production and consumption in that region.

For example, in December 1994 the Flemish government founded in Vito a "Centre for Best Available Techniques linked to an Energy and Environment Information System" or "**BBT-EMIS**". The aim of BBT/EMIS is to collect, evaluate and distribute relevant information concerning technological processes and related energy and environmental aspects. Target groups of BBT/EMIS are authorities and enterprises in the Flanders region of Belgium.

Vito has also developed a "Waste Management Selection System"(AFSS) which offers a decision supportive survey of possible combinations of waste treatment routes for specific waste streams. Target groups for this guidance instrument are government, companies and environmental consulting offices.

In October, 2001 the 'Flemish Information Point for Ecodesign' *Factor 10* was launched. By means of this initiative the Flemish Environmental Authority, OVAM is attempting to make Ecodesign more accessible to companies and designers in Flanders. Vito is hosting the initiative and is responsible for the operational aspects. *Factor 10* collects and makes information on Ecodesign available to the users through its website (www.factor10.be).

Voluntary Agreements

Since the beginning of the 1990s, the Flemish Region has been engaged in voluntary agreements with a large variety of sectors to make the necessary arrangements in order to achieve its environment management goals (OVAM, 1999b). Flanders has opted for an agreed form of co-operation instead of using compulsory measures, whenever possible. It is felt that these voluntary initiatives achieve the same results but often meet less resistance. In the past a voluntary agreement with one or several sectors was often called an environmental covenant or sometimes a protocol agreement. There are several examples, such as the municipal environmental covenants concerning the municipal environment and nature management and the protocol agreement between the three Regions concerning the battery sector, which meets the requirements of the law of 1993 on ecotaxes.

Since the decree of 15 June 1994 came into effect, such agreements between the sectors and the Flemish Region are called agreements on environment management. The waste sector of the Flemish environment management in particular uses the technique of agreements on environment management, sometimes on a voluntary basis, sometimes to complete another policy instrument like the compulsory duty of acceptance or the introduction of federal ecotaxes. By linking an

agreement on environment management with other legal obligations the Flemish Region attempts to use an optimal mix of instruments to achieve its goals – this is especially important in view of the complexity of the environmental problems facing the region.

For waste management the Flemish Region applies a large variety of policy instruments to achieve its objectives – namely to prevent as much waste as possible, to recycle the waste that is still produced as materials or as energy and to use dumping only as the last resort. The Flemish Region also applies a series of environmental levies on waste elimination, of landfilling and incineration bans, of duties of acceptance (take-back), return collection duties, environment licences, subsidies, etc.

Environment agreements fit into the Flemish policy, which aspires a co-operation between the different target groups in society. It is felt that how one approaches a target group can be the key to success. Every group of companies, organisations and persons that can be defined as a separate entity has its own specific needs and desires. Moreover, each target group has a certain impact on the environment. Due to specific arrangements in the agreement on environmental management, both the target group and the Flemish Region have committed themselves to respect a mutual obligation to achieve an optimum environment management for a given period. Another important aspect, beside the achievement of environment objectives, is the financial responsibility for arrangements determined in the agreements on environment management. The measures to prevent, collect and recycle or eliminate are often expensive and someone has to bear the expenses – this is laid out in the agreements.

Flemish waste management distinguishes four categories of voluntary agreements:

i) Agreements on environment management to implement the duty of acceptance or the federal ecotax law.

ii) Agreements on environment management concluded on a voluntary basis: selective collection of old and expired medication.

iii) Environmental covenants concluded on a voluntary basis with towns and municipalities.

iv) Subsidy agreements concluded with a Flemish recycling (re-use) centre.

More details are given on agreements on environment management to implement the duty of acceptance or the federal ecotax law and environmental covenants concluded on a voluntary basis with towns and municipalities below:

Agreements on environment management to implement the duty of acceptance or the federal ecotax law

The legal basis of this agreement comes from Article 10 of the Flemish Waste Prevention and Management (Waste Decree) of 1981. It was further developed in the Flemish regulation concerning Waste Prevention and Management (VLAREA) of 1997. It stipulates that the duty of acceptance of certain waste products and packaging is to be considered as a supplement of the agreements on environment management. Since one of the objectives of this agreement is extended producer responsibility, the whole sales chain is involved (sellers, distributors, producers, importers).

Article 3.1.1.4. of VLAREA explicitly states that the duty of take-back of certain waste products can be concluded by an agreement on environment management closed by the umbrella representative organisation of the companies concerned, or with the producers and/or importers themselves. Another possibility is the creation of a waste management organisation that will be responsible for the observance of the duty of acceptance. Thus far all sectors concerned by the duty of acceptance have chosen to conclude an agreement on environment management with the Flemish Government instead of creating a waste management organisation.

The main objective of the duty of acceptance is to ensure that the responsibility of the collection (up until the transformation) of these waste fractions lies with the producers of these products.

The implementation of the duty of acceptance aims to ensure that both producers and consumers will respect the polluter pays principle.

With the duty of acceptance it is also hoped that since producers will finally be made responsible for their products once they enter the waste stage, they will also be stimulated to improve the design of these products so that they last longer, use less materials in their manufacture and use less harmful materials in their manufacture.

The types of waste fractions covered under these agreements are given in Table A.3.

Table A.3. Types of Flemish waste subject to duties of acceptance and recycling percentages required

Special Waste Fraction	Date of duty of acceptance	Reuse and recycling percentages
Paper waste from daily and weekly newspapers, magazines and periodicals, free regional press and free publications, telephone and fax directories, printed advertisements and other printing that contains advertisements	1 June 1998	Materials reuse: 1998: 60% 1999-2000: 80% 2001: 85%
Accumulators and batteries	1 June 1998	By 2000: collection percentage for batteries: 75% collection percentage for accumulators: 95% materials reuse: 50%
Waste tyres	1 July 1999 (1 for 1) 1 July 2004 (1 for 0)	Landfilling ban without preliminary transformation ban on product reuse (second hand) tread renewal From 2000: 100% collection 25% tread renewal 65% valorisation other than tread renewal
End of life vehicles	1 July 1999 (1 for 1) 1 July 2004 (1 for 0)	Ban to eliminate end of life vehicles without preliminary transformation for valorisation: reuse of old parts, recycling of not usable parts From 2005: 85% of weight reuse and recuperation 80% of weight reuse and recycling From 2015 95% of weight reuse and recuperation 85% of weight reuse and recycling
Household and electronic appliances	1 July 1999 (1 for 1) 1 July 2004 (1 for 0)	Household and electronic appliances select usable and not usable ones in advance From 2000: 95% ferrometal 85% non-ferrometal 20% plastics

Environmental covenant concluded on voluntary basis with towns and municipalities

In May 1991 the Flemish Minister of the Environment at that time made a proposition to each municipality in the region to sign an individual agreement for the development of a preconceived municipal environment and nature management system. These agreements were called environmental covenants. The municipal environmental covenant is a contract that every individual municipality can agree with the Minister of the Environment, and in which the

municipality commits itself to achieve a number of predetermined objectives for the environment and nature over an agreed period. In exchange for this engagement, the Flemish Region subsidises the execution of the municipalities' actions.

The first group of covenants had a maximum duration from 1992 to 1996. A second series of covenants ran from 1997 to 1999. The third generation of covenants were designed to run from January 2000 until December 2001.

Environmental covenant 1992-1996

A total number of 294 of the 308 Flemish municipalities signed the environmental covenant. In the section on waste, the covenant aimed at achieving a general introduction of the selective collection of domestic waste components in all municipalities of the Flemish Region, according to the Waste Plan 1991-1995. Three themes were tackled:

- Selective collection of hazardous waste of domestic origin.
- Development of an operational container park.
- Selective collection of organic waste (green, fruit and garden waste) or dry materials that can be recycled (paper and hardboard waste, glass waste, plastics waste and metal waste) according to certain specific collection systems. The organic waste was called the wet fraction; the dry materials that can be recycled were called the dry fraction.

According to the covenant OVAM could supervise the initiatives taken by the municipalities and intermunicipalities, as well as the collection results. Within the limits of the available budget credits, the Flemish Government could then grant a financial intervention to the municipalities and associations of municipalities, to help out with the costs of the selective collection, at the charge of the Fund for Prevention and Reorganisation for Environment and Nature. The Flemish Government determined the conditions for this financial intervention.

The hazardous waste of domestic origin was collected in container parks or with a chemobile, which collects from door to door, or in town districts. The municipalities have received BEF20 (€0.49) to BEF40 (€0.99) per kilogramme hazardous waste of domestic origin that they have collected. Furthermore the Flemish government granted investment subsidies to all municipalities, whether they have signed the environmental covenant or not, at a rate of 60% for the development of a chemical safe on the container park for the collection of hazardous waste of domestic origin. The Flemish Region also provided its citizens with an ecobox for the collection of hazardous waste of domestic origin. This instrument mix of investment subsidies and the environmental covenant proved effective:

- In 1992 142 municipalities selectively collected 1,552 tonnes of hazardous waste of domestic origin or 0.3 kg per inhabitant.
- In 1996 306 municipalities already collected 8,112 tonnes of domestic hazardous waste or 1.37 kg per inhabitant.
- In 1998 this figure had risen to more than 10,000 tonnes and almost 2 kg per inhabitant.

The network of operational container parks has also been significantly developed by the covenant system. In 1992 155 container parks were operational in 141 municipalities, but by the end of 1996 there were already 279 container parks in 248 municipalities. In addition, 19 smaller municipalities closed a co-operation agreement with a neighbouring municipality or with an intermunicipality to use a nearby container park. By 1999 300 container parks were already operational. Through the environmental covenant the municipalities received BEF500,000 (€12,394) per year for every operational container park. In addition, all municipalities, if they had signed the environmental covenant or not, received 60% of investment subsidies for the building and organising of a container park.

Finally, under the influence of the environmental covenant a strong development of the door to door collection of green, fruit and garden waste, of paper and cardboard, plastics waste, metal

waste and the collection of glass waste through glass containers was undertaken. When signing the environmental covenant, the municipalities had the choice to collect either the dry or the wet fraction. In doing so, they received BEF50 (€1.24) per served inhabitant at first and later BEF20 (€0.49) per served inhabitant per year. In 1992 50 municipalities organised a selective collection of green, fruit and garden waste and only 11 municipalities of the dry fraction, according to the dispositions of the Special Agreement. In 1996 the number of municipalities that collect the green, fruit and garden fraction had increased to 108 and 154 municipalities collected the dry fraction. Two municipalities voluntarily agreed to organise both fractions and achieved that target at the end of 1996. The Flemish Region supported the purchase of collection recipients with subsidies of between 40% and 60%. Transformation installations, especially composting units were financed with subsidies at a rate of 30%.

During the period of the environmental covenant the requests for selective collection of the dry fraction and the target date to develop a hazardous waste of domestic origin collection and of an operational container park were adapted by the Flemish Minister of the Environment. The objectives of 1991 had been too difficult to achieve for most municipalities.

As a result of this first generation of environmental covenants the selective collection of domestic waste in Flanders was introduced in a very structured manner and the volume of domestic waste that had to be eliminated had decreased from 330 kg per inhabitant to 280 kg per inhabitant. Since 1991 OVAM has monitored the domestic waste policy on the basis of information that the municipalities procure OVAM every year concerning the collection and transformation of domestic waste.

Environmental covenant 1997-1999

The objectives of the *Domestic Waste Execution Plan 1997-2001* required that prevention and reuse of waste has to receive more attention and the selective collection of the dry and the wet fraction had to be introduced in all municipalities.

The second-generation environmental covenant was composed of one obligatory section (the basic agreement) and 11 optional parts (of which only 3 apply to 1999) tailor-made for the different municipalities. The basic agreement adopted the obligations of the first generation environmental covenants. For the waste element it was required to develop an operational container park and to further develop the selective collection of hazardous waste of domestic origin, green, fruit and garden waste, paper and hardboard waste, glass waste, crude waste and PMD waste. PMD is the selective collection of plastic and metal packaging and beverage packaging. Municipalities that had no green, fruit and garden waste collection, at minimum have to collect green waste. The municipality also has to take measures to stimulate a preventive behaviour of the inhabitants. The municipality engages to supply OVAM every year with information on the collection and transformation of domestic waste.

A total of 284 municipalities signed the basic agreement of the second-generation environmental covenant. The municipalities received 20 BEF (€0.49) per inhabitant and 54 BEF (€1.33) per hectare of the surface of the municipality per year for the complete execution of the basic agreement.

The 11 optional parts contain arrangements for the municipal environment management planning, the environment data bases, the environment inventories, a thorough selective collection, the co-operation with recycle centres (reuse of waste), the municipal nature policy, a lasting municipal policy incorporating waste prevention, employment of ecological and nature workers, the battle against street waste, a durable water policy and a noise action plan.

Option 4, a thorough selective collection, was signed by 184 municipalities. They engaged themselves for 1997, 1998 and 1999 to collect only respectively 300 kg, 255 kg and 150 kg of domestic waste to be disposed of per inhabitant. These municipalities had to respect strict collection systems for the waste fractions from the basic agreement and for metal waste,

electronic and household appliances, building and demolition waste and for reusable waste. In 1998, most municipalities reached the objective of 255 kg per inhabitant, an objective that has been literally copied from the domestic waste execution plan 1997-2001. The municipalities received 30 BEF (€0.74) per inhabitant per year for the execution of Option 4.

Option 5 contained a structured co-operation with a recycling centre subsidised by OVAM for the selective collection of reusable waste. Over 250 municipalities had signed this popular optional agreement. In 1998, 202 of these municipalities met the requirements of this agreement, i.e. the development of a network of recycle centres in Flanders. The municipalities received 5 BEF (€0.12) per inhabitant per year for Option 5.

Option 7 which links waste prevention to a lasting raw materials use, lasting energy and water use and to the restriction of the use of pesticides, was less successful. Only 100 municipalities engaged themselves to execute a lasting municipal waste policy. Only a very restricted number of these municipalities could successfully execute all five themes. This option, which completes the programme Local Agenda 21 of the Rio-Summit of 1992 was the least successful of the second-generation environmental covenants. Because this theme was linked to four other themes, the development of a waste prevention policy in these municipalities was slackened.

Option 9 deals with street waste (litter). Almost 100 municipalities signed this option and started their battle against street waste in 1999. In exchange, these municipalities have received a subsidy of 200,000 BEF (€4,957).

The conclusion for this second-generation environmental covenant is that at the end of 1999 some municipalities had not yet developed a well-developed selective collection system of domestic waste. Nevertheless, 300 container parks were already operational. All municipalities have a selective collection of paper and hardboard waste and of glass waste, most of them as developed as part of the previously mentioned execution plan. Almost all municipalities had a selective collection of green waste and/or green, fruit and garden waste, metal waste, beverage packaging waste, textile waste and plastics waste. The network of recycling centres continued to grow. At the end of 1999 inhabitants of 280 municipalities have access to a nearby recycling centre subsidised by OVAM.

In 1998 60% of all domestic waste fractions was selectively collected. These results were achieved also thanks to the influence of the second environmental covenant. The domestic waste volume that finally had to be eliminated had decreased from 280 kg per inhabitant in 1996 to 200 kg per inhabitant in 1999.

The results of the covenant for years 2000 and 2001 are not yet available.

6. OECD

Background and introduction

For several years the OECD has been making concerted efforts to develop tools and analyses that assist Member countries in preventing and minimising waste. This is currently primarily being done through two initiatives:

i) Work on waste prevention aiming at developing international performance indicators, and evaluating economic incentives.

ii) Work on ways to improve the operation of markets for secondary materials.

The Extended Producer Responsibility (EPR) programme focuses on providing Member governments with information and advice about EPR polices and programmes, e.g., for waste minimisation purposes. OECD's work aims to identify issues and benefits to EPR and to provide suggestions on what is needed to establish effective policies and programmes.

OECD also aims to provide a benchmark for Environmentally Sound Management (ESM) of wastes and scrap materials by developing international ESM guidelines to be used in conjunction

with an environmental management system (EMS). The purpose of this work is to ensure environmentally sound and economically efficient management of wastes that cannot be prevented.

The OECD has also issued several regulations for importing/exporting waste to ensure that hazardous waste is disposed and recovered in an environmentally sound and economically efficient manner. In particular, an OECD wide Control System has been developed for the control of frequently-traded recyclable materials.

OECD waste minimisation survey of Member States

The OECD has been active in the development of surveys, guidelines and analyses regarding waste prevention for Member States and the holding of several workshops at which information is shared, experiences evaluated, conclusions agreed and future work planned.

The overall objective of the OECD's 1996-97 Waste Minimisation Work Programme was to evaluate and propose policies for closing material cycles, and to assess policy options meant to reduce the dependence of waste generation on economic activities. The purpose of Project 1 under that programme, the results of which are summarised below, was to share information on the status of waste minimisation in OECD Member countries and to review national experiences with meeting the targets that had been set.

However, the information available differs widely with regard to level of detail and timeliness. In order to obtain an overview of current national waste minimisation definitions, plans, strategies, instruments and experiences, a comprehensive survey was carried out.

The survey results (OECD, Group on Pollution Prevention and Control, 1998c) provide an overview of waste minimisation in 21 OECD countries as of mid 1996. They serve as the basis to the OECD Waste Minimisation Work Programme. Thus while this survey is somewhat dated, it does give an overview of the types of measures and instruments that have been applied to promote waste prevention and minimisation in the last decade.

In most OECD countries the meaning of the term waste minimisation has not been defined legally, but is derived from laws/regulations concerning waste. Often the meaning is also based on a general understanding of this term. For the purposes of the 1996 study of the OECD the term waste minimisation encompassed the following three elements, in this order of priority:

- Preventing and/or reducing the generation of waste at source.
- Improving the quality of the waste generated, such as reducing the hazard.
- Encouraging re-use, recycling and recovery.

For the purposes of this report, the following elements of that OECD study are discussed in more detail below:

- Relative waste minimisation priorities.
- Target setting.
- Key instruments.
    - plans and programmes.
    - mandatory instruments.
    - economic instruments.
    - suasive instruments.
- Mixes and prioritisation of instruments.

Relative waste minimisation priorities

Twenty of the twenty one countries surveyed reported that they applied a hierarchy with regard to objectives and measures for waste prevention, recovery and disposal. These hierarchies were generally set out in legal documents. Italy did not have a legally defined hierarchy of this type, but applied a hierarchical structure according to the understanding of waste minimisation in that country.

On the basis of the information summarised in Table A.4, the following conclusions can be drawn concerning relative waste minimisation priorities:

- In all the countries surveyed, prevention of waste generation (including prevention of hazard) had priority over any recycling or recovery operation.
- In ten countries, on-site recycling had priority over off-site recycling (i.e. use in other processes). Seven countries considered on-site and off-site recycling to have equal priority.
- Countries did not agree on whether reducing the hazard of the waste generated should have priority over reducing the waste amount. Eleven countries gave the same priority to reduction of hazard and reduction of waste amount.
- Material recycling had a clear priority over energy recovery. Material recycling and energy recovery had the same priority in only six countries. In one of these countries, the UK, decisions concerning which to use were based on Best Practicable Environmental Option (BPEO).
- All the countries surveyed gave priority to recycling and recovery over landfilling.

Priorities were widely discussed at the Berlin Workshop that followed this survey, and consensus was reached on a hierarchy of waste minimisation priorities. According to this hierarchy, the highest priority should be given to waste prevention and reduction at source. Prevention is considered the most effective means of waste minimisation. It would be a crucial element in a waste management strategy. However, prevention will never make other forms of waste minimisation totally unnecessary. At this time, recycling and recovery are the principle means of waste minimisation. Waste prevention should be further developed to fulfil its still great unused potential.

Table A.4. Waste minimisation priorities in OECD countries

	Hierar-chy exists		Waste prevention over recycling			On-site over off-site recycling			Reduction of hazard over reduction of amount			Material recycling over energy recovery			Recycling/ recovery over landfilling		
	Yes	**No**	**Yes**	**No**	**=**	**Yes**	**No**	**=**	**Yes**	**No**	**=**	**Yes**	**No**	**=**	**Yes**	**No**	**=**
Australia	X		X			X			X			X			X		
Austria	X		X			X			X			X			X		
Canada	X		X			n.a.				X		X			X		
Czech Republic	X		X					X			X	X			X		
Denmark	X		X			X					X	X			X		
Finland	X		X					X			X	X			X		
France	X		X					X	n.a.					X	X		
Germany	X		X					X			X			X	X		
Hungary	X		X					X	X			X			X		
Italy		X[1)]	X			X				X		X			X		
Japan	X		X			X					X	X			X		
Korea	X		X			X			X					X	X		
Netherlands	X		X			X					X	X			X		
New Zealand	X		X					X			X	X			X		
Norway	X		X					X		X				X	X		
Poland	X		X			X			X			X			X		
Spain	X		X			X			X			X			X		
Switzerland	X		X				X				X			X	X		
Turkey	X		X				X				X	X			X		
United Kingdom	X		X				X				X			X[2)]	X		
United States	X		X			X					X	X			X		
Total	**20**	**1**	**21**	**0**	**0**	**10**	**3**	**7**	**6**	**3**	**11**	**15**	**0**	**6**	**21**	**0**	**0**

n.a.: no answer; =: same priority

[1)] A hierarchical structure is applied according to the understanding of waste minimisation in that country.

[2)] Case-by-case evaluation is based on Best Practicable Environmental Option (BPEO).

Target setting

Countries provided priority lists of measures that contribute to waste minimisation. The following targets and priorities were reported:

- Reduction of waste generation in general, or of specific waste streams (e.g. construction and demolition waste, green waste, commercial and industrial waste).
- Exact figures (e.g. the maximum amount of waste allowed to be generated or landfilled).

- Recycling rates for municipal waste in general, for specific waste streams (e.g. used packaging or end-of-life vehicles), for industrial sectors (e.g. leather manufacturing, the textile industry, film processing), or for processes (e.g. dry cleaning, metal finishing);
- Quality standards for recycled materials.
- Reduction of hazardous waste in general or of specific hazardous waste streams (e.g. reduction or substitution of hazardous components in paints, batteries, fluorescent tubes, refrigerators, or medical waste).
- Bans on landfilling of wastes or waste types with a high content of hazardous or organic substances (paints, batteries, industrial sludge) or occurring in large amounts (tyres).
- Encouragement of sustainable construction.
- Further development, and promotion, of cleaner technologies.
- Special waste plans for different branches of industry.
- Negotiation of voluntary, industry-specific waste reduction agreements, including material-specific targets or detailed arrangements for waste reduction.

The following general conclusions can be drawn from the material provided by countries:

- 11 of the 21 countries surveyed indicated a preference for voluntary waste minimisation measures. One argument in favour of voluntary measures is that, compared with mandatory measures, they allow industry and other stakeholders maximum flexibility.
- Three countries (Austria, Germany and Korea) preferred mandatory measures. They reported that voluntary approaches often had not been successful. The problem of free-riders was cited as a major stumbling block. Furthermore, some targets had been achieved for only a short time. Falling prices of virgin materials had often resulted in decreased demand for recycled goods. Consequently, voluntary targets had not been met.
- In spite of their different preferences, most countries used combinations of mandatory and voluntary measures to meet waste minimisation targets.

The subsequent Berlin Workshop showed that there is a need for guidelines on setting waste minimisation targets. These guidelines should include practical examples of target-setting, based on the use of the following criteria:

- increasing amounts of generated waste
- the hazard of substances associated with production, products, and wastes to be landfilled
- public pressure
- the difficulty of disposal, and related costs
- the recovery of valuable components
- the availability of clean technologies
- the equitable treatment of the players involved
- the recognition of overall environmental impacts.

Such guidelines should also provide information on possible approaches to meet targets for specific products or waste streams.

The issue of voluntary versus mandatory waste minimisation approaches was also discussed at the Berlin Workshop. Voluntary measures and targets were regarded as an appropriate starting point, as they allow flexibility. However, unfulfilled voluntary arrangements should be backed up by more prescriptive mandatory approaches.

The measurement and evaluation of waste minimisation are closely related to target-setting. Workshop participants therefore recommended that a monitoring system be developed to provide regular data on:

- waste streams requiring final treatment and/or disposal

- priority waste streams
- the contribution of different elements in the hierarchy of waste minimisation priorities.

The information produced by this monitoring system should be suitable for use in refining targets. The costs and benefits of monitoring waste minimisation should be duly considered. Reporting should be kept to a minimum.

Only a few countries used sanctions or other enforcement measures to achieve waste minimisation targets. The use of sanctions was foreseen, however, especially in the case of failure to meet mandatory targets (e.g. obligatory product labelling, product take-back obligations, deposit-refund schemes, restricted product use). Some countries reported that failure to comply with mandatory requirements resulted in fines.

Key instruments

Plans and programmes

Plans and programmes were used to support waste minimisation in all the countries surveyed. General environmental plans and programmes often included sections dealing with waste minimisation, as well as with key products and waste streams. Voluntary plans and programmes (without mandatory provisions) were used more widely than mandatory ones. Support of research and development, and provision of consultancy services, were typically part of voluntary plans and programmes. Mandatory programmes often covered general waste minimisation, key products and waste streams, and the approval, licensing and control of specific installations.

Fifteen countries foresaw more intensive use of plans and programmes in the future. In the Netherlands, Denmark and Germany these instruments had been used for a number of years, and in many areas, and had proven very effective. More intensive use, or extension to new areas, were therefore not foreseen in these countries.

At the federal level, the United States used only voluntary plans and programmes. Turkey reported that only mandatory plans existed in that country. In many countries, plans and programmes (mandatory and/or voluntary) had been established at the regional and municipal level. Table A.5 shows how plans and programmes were being used in the surveyed countries.

Table A.5. Waste minimisation plans and programmes in OECD countries

Plans and programmes (mandatory/voluntary)						
	Area of application			Area of support		
	1	2	3	4	5	6
Australia	v	v	v	v	v	v
Austria	v	v	v	v	m	v
Canada	m/v	m/v	m/v	v		m/v
Czech Republic	m	m	v	v	v	m
Denmark	m/v	v	v	v	v	m
Finland	m/v	m/v	m/v	v		m/v
France	m	m	n.a.	n.a.	n.a.	n.a.
Germany	m/v	m/v	m/v	v	m\v	m
Hungary	n.a.	v	m	n.a.	n.a.	n.a.
Italy	m	v	m/v	v	v	
Japan	m/v	m/v	m			m/v
Korea	v	m	m	v	v	m
Netherlands	v	v	m/v	v		m/v
New Zealand	v	v	v			
Norway	v	v	v	v	v	v
Poland	v	v	v	v	v	v
Spain	v	v	v			
Switzerland	m/v	m/v	m/v		m/v	m/v
Turkey	m	m	m	m	m	m
United Kingdom	m	v	m/v	v	v	m
United States	v	v	v	v	v	v
Total (m/v)	**11/15**	**9/ 17**	**11/16**	**1/14**	**4/11**	**11/10**

1 Municipal waste 2 Key industrial sectors 3 Key products and waste streams
4 Research and development 5 Provision of consultancy services 6 Approval and control for specific plants
m: mandatory v: voluntary n.a.: no answer

Typical positive experiences with plans and programmes included the following:

- They had served an important function by preparing key players for new, more binding waste minimisation targets. General waste minimisation plans and programmes had been supplemented by more specific measures, such as laws and technical standards.
- Voluntary approaches had been successful, as industry had met the targets.
- Publicising the deficiencies of the waste management system, and at the same time proposing solutions, had increased public acceptance of measures to be taken.
- Developing plans in co-operation with stakeholders had facilitated mutual understanding of the roles of authorities, industry, and others.

Typical problems or obstacles included:

- Target groups were not always willing to co-operate (e.g. industry and administrative officials on a lower level).

- Plans and programmes define (and are used to disseminate information on) new waste minimisation targets. They are also used to initiate some basic measures. However, acceptance of these measures is often poor. It is therefore necessary to follow up on and support them with additional/stronger instruments.
- Free-riders do not accept the targets, and therefore take advantage of voluntary programmes.
- There are economic obstacles, such as increases in waste management costs.
- Development and implementation often take a long time. Plans and programmes also tend to become outdated fairly quickly as technologies change, and therefore should be updated regularly.
- Financial aid programmes are often set up to support plan realisation. Acceptance may depend on the general economic situation. Good acceptance is probable if economic advantages can be achieved.

Adequate means may not be available to control the progress of plans/programmes. Sufficient information on their actual performance and effectiveness is therefore often unavailable.

Mandatory Instruments

Two main groups of mandatory instruments were found in the survey: technical standards for production, recycling and recovery; product bans and restrictions.

1) Technical standards for production, recycling and recovery processes

Legally binding technical standards for production, recycling and recovery processes were in force in eight countries. The Netherlands did not have legally binding standards, but a separate institutional body was in charge of supporting authorities by formulating regulations concerning waste prevention and recycling to be included in the licensing process. Germany reported that in existing plants the state-of-the art in waste minimisation was to be achieved via mandatory measures issued by the licensing authorities.

In general, standards were set for specific industrial sectors as well as for specific recycling processes, plants, and production sectors. Three countries reported that standards were legally binding for all plants and production processes.

Almost all the countries that used technical standards considered them an effective instrument and foresaw their intensified use in the future. Most of the countries that did not apply legally binding technical standards also did not consider them effective and did not foresee their greater use in the future.

The following are typical benefits of applying technical standards to production, recycling and recovery processes:

- Stringent end-of-pipe control regulations generate high costs for industry, especially costs related to final disposal, thus stimulating implementation of waste minimisation measures at earlier production stages.
- Minimum technical standards for all waste recycling facilities are absolutely necessary in order to prevent waste being transported to less expensive plants that use lower level technologies.
- Harmonisation of technical standards is a good way to guarantee safe treatment/disposal of all waste streams.

Negative experiences with technical standards included the following problems and obstacles:

- The establishment of technical standards was a very complicated process, as the target groups often had conflicting interests.
- Implementing new technical standards for production processes created technical and economic problems for industry.
- Agreement to adopt new technical standards required the use of considerable persuasion.

2) Product bans and restrictions

Product bans and restrictions were used in 15 countries. The main areas of application were deposit-refund schemes, product labelling, and take-back programmes. Product bans had often been implemented for reasons other than waste minimisation (e.g. banning of CFCs to protect the ozone layer; banning of PCBs and PCTs because of their persistency and health/environmental hazards).

Batteries, packaging and packaging waste in general, and especially beverage containers were typically restricted for waste minimisation purposes. Several countries reported that they applied such restrictions to the disposal of hazardous waste and of used oil and tyres.

Eleven countries considered bans and restrictions to be effective waste minimisation instruments. Most of these countries foresaw intensification of their use in the future.

The following are typical examples of countries' experience with product bans and restrictions:

- Product restrictions should be used if voluntary agreements with industry are impossible or have failed. Use of this mandatory instrument may increase the readiness of industry to set waste minimisation targets.
- Product bans should be used only as a last resort, in cases where products are expected to cause considerable environmental damage.
- Deposit-refund schemes and product take-back obligations can produce high return rates.

Table A.6. Mandatory instruments for waste prevention in OECD countries

Mandatory instruments								
Technical standards for production, recycling and recovery processes			**Product bans and restrictions**					
	Used	Areas of application	Used	Areas of application				
				1	2	3	4	5
Australia			X	n.a.			X	
Austria	X	1, 2, 3, 4	X	X	X	X	X	X
Canada			X	X			X	X
Czech Republic								
Denmark			X	X		X	X	X
Finland	[1)]		X	X	X	X	X	X
France	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Germany	X	1, 2, 3, 4	X	X	X	X	X	X
Hungary	n.a.	n.a.	X	X	X	n.a.	X	n.a.
Italy	X	2, 4						
Japan	X	3	X	X		X	X	X
Korea	X	2, 3, 4	X	X	X	X	X	X
Netherlands	[1)]	n.a.	X	X		X		X
New Zealand								
Norway								
Poland								
Spain			X		X	X		X
Switzerland	X	2, 3	X	X	X	X	X	X
Turkey	X	1, 2, 3, 4	X	X	X	X	X	X
United Kingdom	X	3	X	X	X		X	X
United States			X			X	X	
Total	**8**		**15**	**12**	**9**	**11**	**13**	**12**

1 All plants and production processes
2 Specific plants and production processes
3 Specific industrial sectors
4 Specific recycling/recovery processes

[1)] There are no legally binding technical standards, but waste minimisation requirements are integrated into the licensing process.

1 Product bans
2 Product restrictions
3 Product labelling
4 Deposit refunds
5 Product take-back

n.a.: no answer

Typical problems and obstacles include:

- Free-riders gain economic advantages by ignoring legal restrictions.
- Developing and formulating product restrictions is a complicated process. Economic impacts on industry must be considered.
- Easy-to-use tools to control and monitor restrictions (e.g. recycling rates) are not yet available. Evaluating performance therefore remains difficult.

Economic instruments

Two main groups of economic instruments were found to be in place by this survey: taxes and duties; financial aid and economic incentives:

1) Taxes and duties

Economic instruments are mainly applied in the form of taxes and duties (including fees and licenses) for waste treatment and landfilling. There may also be special taxes and duties on hazardous waste. Seven countries levied taxes/duties on raw materials, resources and energy. Six countries levied them on waste-intensive products such as packaging, in particular non-refillable and non-recyclable containers.

Nine out of 15 countries reported that the revenues from taxes/duties were spent in ways that supported waste minimisation or waste management. In six countries these revenues were not devoted to waste minimisation. All the countries considered taxes and duties to be effective waste minimisation instruments. Most foresaw more intensive use of these instruments the future. Taxes and duties have been effective because waste producers implement waste minimisation measures in order to avoid paying them.

A typical problem reported is that some waste producers try to avoid paying disposal duties by using dubious recycling measures. Duties may also encourage illegal dumping.

2) Financial aid and economic incentives

All the countries surveyed except Turkey indicated that financial aid and economic incentives were used to promote waste minimisation. The main areas of application were:

- research and development related to waste prevention/recovery technologies
- pilot projects
- investment in low-waste production/products
- consultancy services
- innovative solid waste recycling technologies
- eco-balances, life-cycle assessments, and eco-auditing.

Financial aid and economic incentives most often took the form of subsidies, low-interest credits, cost-free consultancy services, and sureties.

In almost all countries funds were obtained and used by the central government, but that was often done by regional and municipal governments as well. Only three countries reported that industry funded projects related to waste minimisation. Some countries foresaw increased industry involvement in this area in the future.

In most countries government institutions, industry and waste managers, universities, and research institutes applied for financial aid. Almost all countries considered financial aid an effective instrument. Ten countries foresaw more intensive use in the future. Some countries indicated that financial aid was already significant. Some were considering replacing subsidies with measures based on the polluter-pays principle. The following are typical examples that support the use of financial aid and economic incentives:

- Financial aid clearly promotes the achievement of desired outcomes. It makes a considerable contribution to improving waste management.
- Public financial aid stimulates further private investment.
- Financial aid can be used to maintain a company’s competitiveness while new environmental technology is being implemented.

Table A.7. Economic instruments in use in OECD countries for waste minimisation

Economic instruments											
Taxes and duties					**Financial aid and economic incentives**						
	Used	Areas of application			Used	Areas of application					
		1	2	3		1	2	3	4	5	6
Australia	X			X	X	X	X		X	X	
Austria	X	X		X	X	X	X	X	X	X	X
Canada	X		X	X	X	X	X	X	X	X	X
Czech Republic	X	X		X	X	X	X	X	X	X	X
Denmark	X	X	X	X	X	X	X	X	X	X	X
Finland	X	X	X	X	X	X	X	X	X	X	X
France	X	n.a.	n.a.	X	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Germany	X[1) 2)]		X[1) 2)]	X[1) 2)]	X	X	X	X		X	X
Hungary	X	n.a.	X	n.a.	X	n.a.	n.a.	X	n.a.	n.a.	n.a.
Italy	X	X		X	X	X	X		n.a.	X	
Japan					X	X	X	X	X	X	X
Korea	X	X	X		X	X	X	X		X	
Netherlands	X	X		X	X	X	X		X	X	
New Zealand					X	X	n.a.	n.a.	X	n.a.	X
Norway											
Poland	X			X	X	X	X	X	X	X	
Spain					X	X	X	X	X	X	X
Switzerland	X			X	X	X	X		X		X
Turkey	X			X							
United Kingdom	X			X	X	X	X		X	X	X
United States	[2)]				X	X	X	X	X	X	X
Total	**16**	**7**	**6**	**14**	**18**	**17**	**16**	**12**	**14**	**15**	**12**

1 Raw materials, resources or energy
2 Waste-intensive products
3 Treatment and landfilling
n.a.: no answer
[1)] Only in some states and cities
[2)] Not applied on the federal level

1 Research and development on waste prevention/recovery technologies
2 Pilot tests
3 Investments in low-waste production/products
4 Consultancy services
5 Innovative solid waste recovery technologies
6 Eco-balances, life-cycle assessments, eco-auditing

However, it was often mentioned that:

- Providing financial aid is a financial burden on the government.
- Procedures used to apply for financial aid are sometimes complicated and time-consuming.
- Co-ordination of efforts is essential in order to avoid giving support to counterproductive measures.

Table A.7 summarises the economic instruments in use.

Suasive instruments

Two main groups of suasive instruments were identified in the survey: information provision and public relations; EMS, environmental reporting and eco-labelling.

1) Information provision and public relations

Information and public relations campaigns are widely used to support waste minimisation. The following are some of the main areas of application:

- Provision of information through public information offices serving private households or industrial waste producers, and the creation of information systems and databases to disseminate state-of-the-art waste minimisation techniques.
- Initiation of pilot projects by public authorities.
- Creation of trading opportunities for recycled goods and products.

Half the surveyed countries reported that information and consultancy services had been established for specific target groups by law. In most cases, administrative bodies (central, regional and municipal) had set up these services. In seven countries, industry and related associations provided information and consultancy services.

14 countries considered information and public relations initiatives to be effective. Fifteen countries foresaw more intensive application of these instruments in the future.

The following are typical positive experiences:

- Information provision and consultancy are part of an interactive process (i.e. information exchange). They can therefore be (self-developing) educational instruments that are widely accepted by authorities, industry, businesses, and the general public.
- These instruments have proven effective in all industrial sectors. Industry has often benefited financially from the use of suasive instruments.
- It is important to ensure uniform transfer of information to all target groups. Adequate information leads to good acceptance of governmental measures, and thus to more efficient use of resources.

The following problems and obstacles were reported:

- It was difficult to judge the success of campaigns aimed at influencing the behaviour of consumers and private households.
- Print, electronic media, and other advertising might provoke strong negative reactions.
- Consumer-orientated information/public relations campaigns needed to be co-ordinated with educational programmes in schools and universities, as they might then be more efficient and be carried out on a higher level.
- Consultancy services on the municipal level needed to be better co-ordinated.

- Several countries aimed at setting standards for nationwide information and public relations campaigns. So far, the co-ordination of measures at the regional and local level had not been satisfactory.

It was widely agreed at the Berlin Workshop that suasive instruments contributed significantly to waste minimisation. Good communications, consultation, wide participation, access to information, and flexibility in implementation are all usually important for success in waste minimisation.

2) EMS, environmental reporting and eco-labelling

Companies in most of the countries surveyed used Environmental Management Systems (EMS) and produced environmental reports. However, most of the countries reported that the number of companies actually applying these measures was rather small. In some countries environmental and waste reports were mandatory. Such reports were expected to be mandatory in other countries in the future.

Eco-labelling systems had been initiated in most countries. The number of products and services that had been awarded an eco-label in each country differed considerably. There were indications that eco-labelling had been interpreted in some countries as simply requiring manufacturers or retailers to provide information on their products (e.g. components, recycling methods).

Fifteen countries considered Environmental Management Systems, environmental reports and eco-labelling to be effective instruments and foresaw their more intensive use in the future.

Typical positive experiences included the following:

- The review of waste management plans undertaken as an integral part of EMS had resulted in reduction of waste generation, as well as in cost savings.
- Waste or environmental reports had been useful in waste planning and had proved essential when future waste minimisation policies were decided upon.

Problems and obstacles included:

- With respect to environmental reports and waste management plans, knowledge of obligations and possibilities was not sufficiently widespread among companies. These instruments had so far only been used by large or innovative companies.
- Some countries still lacked sufficient information to be able to quantify the success of EMS and eco-labelling.

Eco-labelling was considered to provide good support for waste minimisation policies. Eco-labelling systems were increasingly important in many countries.

Typical positive experiences included:

- Products that had been awarded an eco-label usually gained market advantage.
- Eco-labelling could have important secondary effects on waste minimisation. For example, during the development and fulfilment of eco-labelling criteria, various features of the production process might be scrutinised.

Problems and obstacles included:

- The measurable contribution of eco-labelling to waste minimisation might be rather small.
- Developing criteria for specific products and services could be time-consuming. In addition, the composition of the issuing bodies (which might include representatives of government, administration, industry, or environmental groups) could be controversial.

Table A.8. Suasive instruments for waste minimisation in OECD countries

Suasive instruments					
Information provision and public relations				**EMS, environmental reports, eco-labelling, etc.**	
	Form of application			Area of implementation	
	Pilot projects	Information services	Waste exchanges	Environmental Management Systems, reports and waste balances	Eco-labelling
Australia	X	X	X	X	X
Austria	X	X	X	X	X
Canada	X	X	X	X	X
Czech Republic	X	X	X	X	X
Denmark	X	X	X	X	X
Finland	X	X	X	X	X
France	X	X	X	n.a.	n.a.
Germany	X[1)]	X	X	X	X
Hungary	n.a.	n.a.	n.a.	X	X
Italy	X	X	X	X	X
Japan	X	X	X	X	X
Korea	X	X		X	X
Netherlands	n.a.	n.a.	n.a.	n.a.	n.a.
New Zealand	X	X	X	X	X
Norway					X
Poland	X			X	
Spain	X	X	X	X	
Switzerland		X		X	
Turkey	X	X	X	X	X
United Kingdom	X	X	X	X	X
United States	X	X	X	X	X
Total	**17**	**17**	**15**	**18**	**16**

n.a.: no answer [1)] Only in some states

Mixes and prioritisation of instruments

Obviously different countries use a mix of different instruments – some more than others depending on the legislative, social and economic frameworks of the individual countries.

Plans and programmes, financial aid, economic incentives, and suasive instruments were used in almost all countries. Taxes and duties, and product bans and restrictions, were also widely used. Technical standards were used in fewer countries.

Only a few countries provided detailed information on their experiences with instrument mixes. It appears that overall the use of such mixes to meet waste minimisation targets may not yet have been studied thoroughly. Canada remarked, for example, that successful instruments were generally regarded as being successful on their own rather than being analysed in combination with others.

The Berlin Workshop provided the opportunity for countries to compare experiences with regard to various instruments' effectiveness. Most countries used a mix that corresponded to national and local circumstances and to specific waste streams. Each type of instrument had advantages and disadvantages. For example:

- Plans and programmes were essential to establish a framework, and to give coherence and direction.
- Use of mandatory instruments could ensure that minimum standards were being observed and eliminate free-riders.
- The use of economic instruments demonstrated that proven results in using the power of the market, equitable distribution of the burden of payment, and the generation and allocation of revenues were key issues.
- Suasive instruments had an essential supporting role, for example in relation to consumers and small and medium-sized enterprises.

Many instruments had demonstrated cost-effective results, especially with regard to the promotion of clean technology. However, the most effective outcome was likely to involve the use of a combination of instruments. Assessment tools in this area, such as full-cost accounting and life-cycle analysis, were relatively weak.

Potentially wider impacts included job creation, health and safety implications, improved economic efficiency, and greater benefits in terms of sustainability. Barriers to progress included the need to obtain financing and resources, resistance to change, short-term perspectives, and competing priorities.

Failures have occurred, due for example to poor enforcement of mandatory instruments, inappropriate voluntary agreements, and inappropriate use of taxation.

Regarding prioritisation, Denmark, New Zealand, the United States, and to some extent Canada gave low priority to mandatory plans and programmes and other mandatory instruments. These countries gave higher priority to voluntary plans and programmes. Canada, Denmark and New Zealand also gave high priority to economic and suasive instruments. The Czech Republic, Italy, Korea and Turkey gave high priority to mandatory plans and programmes and to other mandatory instruments.

Although lack of data from four countries (Australia, France, the Netherlands and Norway) may have introduced some distortion, the statistical analysis presented here generally illustrates the situation in the countries surveyed. While average rankings of the instruments are quite close, standard deviations differ significantly, demonstrating that the extent of agreement on these instrument among countries was very uneven. Thus, the low standard deviation for economic instruments indicates that they were given relatively high priority by all countries. There was less agreement on the use of the other four instruments.

Table A.9 shows the instrument mixes in the various countries. Table A.10 indicates the prioritisation of instruments used.

Table A.9. Instrument mixes used in OECD countries for waste minimisation

Instrument mixes														
	Plans and programmes		Mandatory instruments				Economic instruments				Suasive instruments			
			Technical standards		Bans and restric-tions		Taxes, duties (licenses)		Financial aid and economic incentives		Informa-tion, public relations		EMS	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Australia	X			X	X		X		X		X		X	
Austria	X		X		X		X		X		X		X	
Canada	X			X	X		X		X		X		X	
Czech Republic	X			X		X	X		X		X		X	
Denmark	X			X	X		X		X		X		X	
Finland	X			X	X		X		X		X		X	
France	X		n.a.	n.a.	n.a.	n.a	X		n.a.	n.a	X		n.a.	n.a.
Germany	X		X		X		X		X		X		X	
Hungary	X		n.a.	n.a.	X		X		X		n.a.	n.a.	X	
Italy	X		X			X	X		X		X		X	
Japan	X		X		X			X	X		X		X	
Korea	X		X		X		X		X		X		X	
Netherlands	X			X	X		X		X		n.a.	n.a.	n.a.	n.a.
New Zealand	X			X		X		X	X		X		X	
Norway	n.a.	n.a.	n.a.	n.a.	n.a.	n.a	n.a.	n.a	n.a.	n.a	n.a.	n.a.	n.a.	n.a.
Poland	X			X		X	X		X		X		X	
Spain	X			X	X			X	X		X		X	
Switzerland	X		X		X		X		X		X		X	
Turkey	X		X		X		X			X	X		X	
United Kingdom	X		X		X		X		X		X		X	
United States	X			X	X			X	X		X		X	
Total	**20**		**8**	**10**	**15**	**4**	**16**	**4**	**18**	**1**	**18**		**18**	

n.a.: no answer

Table A.10. Prioritisation of waste minimisation instruments in OECD Countries

Prioritisation of waste minimisation instruments					
	Mandatory plans and programmes	Voluntary plans and programmes	Mandatory instruments	Economic instruments	Suasive instruments
Australia	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	1	1	5	3	1
Canada	3	5	3	4	5
Czech Republic	5	2	4	3	1
Denmark	1	5	3	5	5
Finland	3	2	5	5	5
France	n.a.	n.a.	n.a.	n.a.	n.a.
Germany	3	2	1	4	3
Hungary	4	4	5	5	5
Italy	4	3	5	3	1
Japan	5	5	5	5	5
Korea	5[1)]	3[1)]	5[1)]	4[1)]	4[1)]
Netherlands	n.a.	n.a.	n.a.	n.a.	n.a.
New Zealand	1	4	1	3	4
Norway	n.a.	n.a.	n.a.	n.a.	n.a.
Poland	3	5	4	5	4
Spain	4	4	2	4	3
Switzerland	3	3	3	4	5
Turkey	5	4	4	5	1
United Kingdom	3	4	3	5	5
United States	2	4	1	4	3
Average	***3.2***	***3.5***	***3.5***	***4.2***	***3.5***
Standard deviation	***1.35***	***1.19***	***1.46***	***0.78***	***1.58***

Ranking from (1) for low to (5) for high priority
n.a.: no answer
[1)] Corrected according to the description given in the questionnaire

Conclusions and recommendations of OECD survey

This survey showed that by the mid 1990s there were several waste minimisation policies in place in OECD countries and that in some respects these policies differed considerably. Furthermore the types of instruments and mix of measures again differed substantially - perhaps not unexpectedly given the wide spread of countries, cultures, economies and social structures surveyed.

Waste minimisation is a fundamental element of a policy aiming at sustainable development, which is the long-term objective of all OECD countries. Waste minimisation activities promote sustainable development through:

- Low-waste technologies that lead to reduced resource extraction.
- The design and development of low-waste products and services.
- The reduction of hazardous emissions and of environmental impacts in general.
- The reduction of total production volume through the use of products designed for prolonged use.
- Changes in consumption patterns.

Based upon the survey and subsequent workshop in Berlin in October, 1996 several conclusions and recommendations were drafted by the OECD on these issues, as follows:

Common understanding and call for harmonisation

The survey and the Berlin Workshop, both carried out under the OECD Waste Minimisation Work Programme, have revealed a wide variety of approaches to waste minimisation. They have also demonstrated that waste management systems are not comparable between Member countries. In some countries, up-to-date and fully equipped waste management systems (i.e. separate collection systems, waste treatment facilities, recovery programmes, information systems, comprehensive legislative frameworks, with public awareness of environmental issues) exist, while other countries have only started building up and implementing these elements.

Keeping these national differences in mind, countries are attempting to establish harmonisation of waste minimisation standards and are examining international policy approaches. Areas of common understanding, and areas in which countries are calling for harmonisation, include the following:

- According to the survey and the outcome of the Berlin Workshop, **there is a broad consensus on the working definition of waste minimisation**[8] and on the important role of waste minimisation within the overall goal of sustainable development. Moreover, **there is general agreement on waste minimisation priorities, with waste prevention being given the highest priority.**
- There was intensive discussion at the Berlin Workshop of the controversial issue of incineration's role in the context of waste minimisation. Agreement could not be reached on whether waste incineration lies within the scope of waste minimisation. A few countries have established criteria to distinguish energy recovery from incineration and have established minimum standards for incineration plants. **Due to these differences, waste incineration will remain a key issue for discussion.**
- Waste recycling facilities are subject to licensing procedures in all the countries surveyed. However, only some countries have enacted or enforced legally binding technical standards with regard to the operation of these facilities. Recycling standards vary from country to country, or even within countries, and different recycling standards lead to different prices being charged for recycling services. As a consequence, waste may be transported to the facilities that operate most cheaply, which usually use lower level technologies. Low-quality recycling leads to the production of low-quality secondary

[8] Emphasis made by OECD

materials, with drastically reduced market competitiveness. Nevertheless, these materials often remain more expensive than the virgin raw materials they could replace. Moreover, low-quality recycling processes often have negative environmental impacts and produce goods that are harmful to human health as well as the environment. Minimum technical standards applicable to all waste recycling facilities, and acceptable to all countries, would be a means of preventing the above-mentioned effects. **As a minimum, a framework of technical standards could be initiated on an international level**.

- Landfill planning and construction are regulated by technical standards in several countries. In some cases, landfilling of certain wastes is prohibited and landfill operations have to meet specific standards. The construction of landfills may also be restricted to certain areas. **These standards could serve as a basis for the development of common technical standards for landfill planning, construction, operation and aftercare.**
- Eco-labelling schemes exist in several countries and are continuously being expanded. The type and number of eco-labelled products and services differ. Countries report that developing labelling criteria for products or services is very time-consuming, as these criteria must be strict in order to ensure that the label is valid and that not all products can easily meet the requirements. An open exchange of information on eco-labelling criteria, which might lead to speeding up the process of labelling products or services, is desirable. **In the future, the concept of an international eco-label might be of interest.**

Successes and failures of waste minimisation activities

The survey and the Berlin Workshop have made available extensive information on waste minimisation instruments in place by 1998, and on various aspects of the implementation of these instruments. Many countries also provided valuable information with regard to their experiences with waste minimisation activities and instruments. However, assessing the effectiveness of various instruments is difficult and cannot be carried out in all cases.

Only a few instruments can be directly linked to visible and measurable success or failure. Successful waste minimisation usually depends on the use of more than one measure. The relative effectiveness of a single measure often cannot be determined at all. Furthermore, country-specific circumstances that influence effectiveness usually cannot be summarised in a few words. The successes and failures of several instruments were nevertheless reported, and the conditions that had promoted or hindered effective implementation were described.

Bearing in mind the above remarks, it should be emphasised that the examples cited here are sometimes derived from information provided by only one or a few countries. Accordingly, they should not be understood to be “recipes”. Individual adaptation and fine-tuning would be necessary to ensure maximum success.

- **Waste minimisation instruments are used in many different combinations in OECD countries.** Their implementation, or lack thereof, depends on the overall approach to waste policy (for example, whether voluntary or mandatory instruments are favoured). Countries that traditionally use a legal approach to influence target groups tend to follow the same approach with regard to waste minimisation. However, many countries rely completely on voluntary or suasive instruments. Either approach may be effective, or ineffective. Effectiveness ultimately depends on technological, social, economic and cultural factors. It is one of the principle responsibilities of policy-makers to discover which combinations of instruments can best be applied.
- **Waste minimisation is a societal challenge**. Providing, and assuring the dissemination of the best possible information to all concerned individuals and groups is of the utmost importance. All the countries surveyed consider information provision and public relations, along with other suasive instruments, to be important and effective instruments. In particular, countries that have already made great efforts in regard to waste minimisation, including the creation of comprehensive legislative frameworks, report that information dissemination is crucial to ensure the best possible law enforcement. The

same applies to the propagation of clean technologies – they need to be publicised and marketed in order to gain market shares.

- **Clear emphasis is placed on education**, which plays a major role in building up future public awareness of waste minimisation. Education is not an "end-of-pipe" instrument: it is just the opposite. A well educated and well informed society is a prerequisite for successful implementation of waste minimisation measures.
- Experience shows that **waste minimisation measures tend to be accepted by target groups as long as they fit within these groups' "comfort zone"**. Each individual or group naturally wishes to forward its own interests, especially economic ones. Multi-stakeholder consultations have therefore been initiated in some countries in order to discover ways and means to achieve full acceptance by all the groups involved at an early stage. This strategy has been effective in several countries.
- Voluntary industrial waste reduction agreements, based on bilateral or multi-stakeholder consultations, have usually led to positive outcomes. This is particularly true where there is a strong possibility that stringent legislation may come into force unless a voluntary agreement can be reached. These agreements also have a potential disadvantage: free-riders may gain competitive advantages through not complying with such agreements.
- **Enactment of laws appears to take place much more rapidly than law enforcement.** The survey results demonstrate that there is an obvious need to narrow this gap. One solution might be to inform groups targeted by new laws (e.g. industry, private households, public authorities) well in advance of upcoming mandatory waste minimisation measures.
- **Along with efforts to increase material re-use and recycling, there should be promotion of the use of recycled materials in products.** This is one important means of closing material cycles and using raw materials and energy more efficiently. Secondary products are traded on existing markets. They therefore compete most often with comparable products made of virgin raw material, which may be even cheaper than the secondary products. This economic barrier for secondary products could be avoided. Marketing instruments have proven useful in this regard. For example, some countries have established standards for secondary goods (for example, re-refined engine oil, gravel made from CD waste) to promote consumer acceptance and fair competition with virgin products. Another instrument used is a tax on the use of virgin material in certain products. Without such measures, recycled material will not achieve pay-back and subsequent efforts to reduce waste generation will be of no economic interest to the waste generator.
- **Activities aiming at efficient use of resources, and hence waste prevention in the early stages of a product's life-cycle, are receiving increasing attention and finding wide acceptance.** Some countries operate clean technology programmes whose purpose is to avoid waste generation through innovative product design or changes in manufacturing technologies. This approach appears increasingly important, as countries are calling for the dissemination of information on innovative clean technologies. An at-source approach is essential for the minimisation of waste resulting mainly from production processes. It is also a prerequisite for successful minimisation of post-consumer waste, as product design and advanced manufacturing processes can reduce post-consumer waste and may facilitate more efficient recycling and recovery of the remaining waste.
- **Extended Producer Responsibility schemes are being planned and implemented in several countries**. Examples are mandatory take-back schemes for end-of-life vehicles, and voluntary schemes for a number of products. Usually manufacturers or retailers are legally obligated to take back end-of-life products and to ensure their appropriate recycling and safe disposal. This measure contributes to closing material cycles by feeding recycled materials back into the product chain. One unsolved problem concerns the ecological responsibility for a product, which does not lie merely with the consumer or manufacturer but should be shared by others in the product chain. Recycling and safe

disposal costs now tend to be passed on to the last person in the chain, the consumer. Extended Producer Responsibility schemes can have a direct impact on manufacturing processes, for example product design. Their implementation seems especially appropriate in combination with clean technology programmes. As a prerequisite, Extended Producer Responsibility schemes require wide public awareness and acceptance.

- **Other voluntary industry waste reduction agreements include not only a set of targets, but also a code of good waste management practice or guidelines for waste management in different industrial sectors.** These voluntary agreements have led to reduced waste generation and other reductions in environmental impact. Moreover, industry has gained financial benefits through decreases in waste management costs, enhanced productivity, and an improved public image.
- **Separate collection of municipal waste varies greatly, reflecting regional differences.** The most common collection schemes are voluntary: private households may collect, for example, waste glass or paper separately and take them to collection points, or these types of waste may be collected regularly via kerbside programmes. Providing such opportunities is seen as one of the measures that create awareness of the fact that wastes contain valuable components, and that source separation is an essential part of successful recycling programmes.

Recommendations

The OECD survey provided information on the status of waste minimisation policies in the majority of OECD countries in 1996. The country-specific Waste Minimisation Profiles published in a separate volume (OECD, Group on Pollution Prevention and Control, 1998d), together with the findings of this survey and the outcome of the Berlin Workshop, constituted a comprehensive set of information on waste minimisation programmes in OECD countries at that time.

To continue work on the issues addressed by these OECD activities, and to fill in remaining information gaps, the following recommendations were made by the OECD, in 1998:

- The **significant unused potential of waste prevention** should be further explored, and exchange of information in this regard should be facilitated.
- As part of current work in the OECD's Waste Minimisation Work Programme, **guidelines for waste minimisation target-setting** should be developed, updated, and disseminated to a wide audience including all stakeholders.
- The **role of energy recovery within waste minimisation** should also be further explored. Work could be undertaken with the aim of arriving at a better understanding of the costs and benefits of incineration.
- The reporting of waste minimisation performance in OECD countries would be efficiently accomplished using a **standardised monitoring system**, which could be progressively refined. The feasibility of indexing waste to units of production could be explored. Wide dissemination of monitoring results by all available means should be ensured.
- Taking full advantage of the sharing of information and experience that takes place among OECD countries, policy guidance could be developed on **the best use of waste minimisation instruments under different circumstances** and the use of tools to assess effectiveness.
- As there is no clear overall preference for voluntary or mandatory waste minimisation approaches in OECD countries, there could be **further exploration of the conditions under which both voluntary and mandatory approaches have been effective**.
- As part of voluntary waste reduction agreements in some countries, industry has an undefined **waste management code of practice**. A similar code could be worked out at the OECD level.