

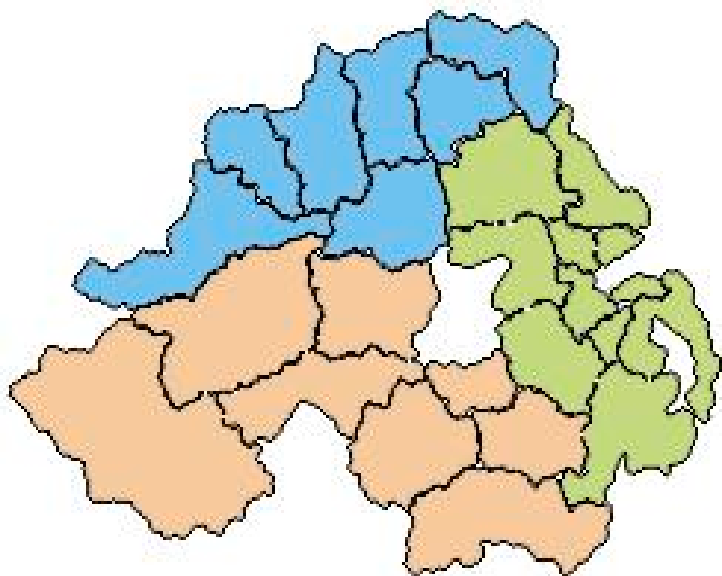
Biodegradable Waste Strategy for Northern Ireland

DRAFT

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An Agency within the
Department of the
Environment



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GLOSSARY OF TERMS

Introduction

This Glossary provides a summary of the definitions and terms that have been used for the purposes of this Strategy. Reference should be made to the relevant legislation for legal definitions, where required.

Waste Definitions

Biodegradable waste is defined as any waste that is capable of undergoing anaerobic or aerobic decomposition, such as food and garden waste, and paper and cardboard.

Commercial waste means waste from premises used wholly or mainly for the purposes of a trade or business, or the purposes of sport, recreation, or entertainment.

Controlled waste refers to household, commercial and industrial waste, or any such waste, as defined in the Waste and Contaminated Land (NI) 1997. Such wastes are subject to the control of the relevant authority, and require a waste management licence for their disposal.

Household waste means waste arising from a domestic property, caravan, residential home, premises forming part of an educational establishment, and premises forming part of a hospital or nursing home.

Industrial waste means waste from a factory, and any premises used for the purposes or provision of public transport, postal and telecommunications services, and utilities.

Municipal waste is defined as household waste, and any other waste under the control of (ie collected by) District Councils, or their agents, acting on their behalf'.

Sewage sludge are the solids captured and semisolid residuals generated by the treatment of commercial and domestic sewage at Waste Water Treatment Works.

Waste is defined as any substance or object which the producer, or the person in possession of it, discards, or intends to discard.

Waste Treatment Terminology

Anaerobic digestion: a biological process that involves the breakdown of organic material by bacteria in the absence of oxygen. It produces a biogas that can be used to produce energy, and a digestate.

Composting: the controlled biological decomposition of biodegradable materials (e.g. garden waste or sewage sludge) under aerobic conditions in order to produce compost, which can be used, subject to quality standards, as a fertiliser or soil improver.

Energy from Waste: thermal or biological processes that recover the energy from waste materials to produce power and heat. It includes thermal treatment processes: incineration, and gasification and pyrolysis; as well as anaerobic digestion.

Landfilling: the disposal of waste by its permanent deposition in or on the ground.

Materials Recovery Facility (MRF): a facility at which materials, for example, paper, metals, and/or plastics, are separated manually or mechanically, from mixed waste streams, and baled and stored for reprocessing.

Recovery: the recovery of energy or materials, and includes recycling, composting and energy from waste.

Recycling: the collection or recovery of re-useable materials from the waste stream, and the subsequent processing of those materials into useable products.

Reuse: the re-use of waste items, for example bottles or packaging.

Treatment: the physical, thermal, chemical or biological processes, including sorting, that change the characteristics of the waste, in order to reduce its volume or hazardous nature, facilitate its handling, or enhance recovery.

Waste Minimisation: the process of reducing the quantity of waste generated which requires treatment and/or disposal.

Waste Transfer Station: a facility that is used for the 'bulking up' and temporary storage of wastes, by transferring waste materials from smaller receptacles into larger ones without disposing of the waste on site. The waste is then transferred from the site to another facility for treatment or disposal. The process may or may not be combined with the recovery of waste materials.

EXECUTIVE SUMMARY

Introduction and Contents

1. The Biodegradable Waste Strategy for Northern Ireland has been produced in fulfilment of obligations under Articles 5(1) and 5(2) of the Landfill Directive (1999/31/EC). The scope of this Strategy encompasses all waste streams that have a biodegradable content, including the biodegradable fraction of the following waste streams:

- Municipal Wastes
- Commercial and Industrial Wastes
- Packaging Wastes
- Construction and Demolition Wastes
- Sewage Sludge
- Agricultural Wastes

Biodegradable waste is defined as *“any waste that is capable of undergoing anaerobic or aerobic decomposition, such as food and garden waste, and paper and cardboard”*.

2. This strategy document provides an important platform from which to effect change in both our attitude and our approach to management of these wastes. The primary objectives for the Biodegradable Waste Strategy, achievable through the active support and participation of all those involved in the production and management of biodegradable wastes, are to:

- Promote the sustainable management of biodegradable wastes; and
- Comply with Northern Ireland’s obligations under Articles 5 (1) and 5 (2) of the Landfill Directive.

3. The Biodegradable Waste Strategy addresses the policy and legislative context, biodegradable waste production and capacity requirements, an integrated approach to landfill reduction, actions and commitments and implementation monitoring. Annexes to the document provide further detail on policy context, an overview of technologies for the treatment of biowaste encompassing compost quality standards, a review of European practices and outline of the current regulatory framework on animal by-products.

Legislative and Policy Context

4. The Biodegradable Waste Strategy is set in the context of published policy and emerging legislation for waste management in Northern Ireland. This document complements, and should be read in association with, the Department’s Waste Management Strategy for Northern Ireland (March 2000) and the three sub-regional Waste Management Plans (adopted January 2003), prepared by district councils working together in partnerships.

5. An important future legislative provision that will impact on the management of biodegradable wastes is the UK-wide Waste and Emissions Trading Bill, which is currently progressing through Parliament and is expected to be enacted in summer 2003. This will set the framework for Northern Ireland to meet the statutory Landfill Directive targets at 2010, 2013 and 2020 for the diversion of biodegradable municipal waste from landfill, and the reporting of progress towards these targets from 2004. The Landfill Directive targets are summarised in Table 1. The statutory obligation to comply will lie with district councils.

Table 1: Landfill Directive Targets

To reduce the quantity of biodegradable municipal waste disposed of to landfill to:	
▪	75% of 1995 levels by 2010
▪	50% of 1995 levels by 2013
▪	35% of 1995 levels by 2020

Biodegradable Waste Production

6. Current and predicted waste production for the waste streams covered in the Biodegradable Waste Strategy has been based on published information in the Waste Management Plans and updated to incorporate 2001 information from data surveys carried out by the Department. This data includes an estimate of the biodegradable proportion of total wastes, current management practices and published targets. Table 2 summarises the existing quantities.

Table 2: Summary of Biodegradable Waste

Waste Stream	Sources	Biodegradable proportion of total wastes ²	Biodegradable components	Biodegradable waste (tonnes)
Municipal Waste	Household and Commercial Premises	71% ^a	Catering (kitchen) wastes, paper and cardboard, green (garden) wastes	750,000
Commercial and Industrial Wastes	Commercial and Industrial Premises	Commercial: 80% ^b Industrial: 50% ^b	Food processing wastes, edible oil and fat, catering (kitchen) wastes, paper and cardboard, wood, textiles	473,500
Packaging Wastes	Household, Commercial and Industrial Wastes	53% ^c	Paper and cardboard, wood	218,000
Construction and Demolition Wastes	New-build Construction Demolition Works	1% ^d	Wood	12,000
Sewage Sludge	Waste Water Treatment Works	100%	Sewage Sludge	32,076
Agricultural Wastes	Agricultural, horticultural and associated premises.	99% ^d	Manure and slurries, straw and vegetable waste, paper and cardboard, fallen livestock	15.4 million

Notes: Estimated biodegradable proportions estimated on the basis of data from:

- a: NI 2000 Waste Characterisation Study
 b: The National Waste Strategy for Wales
 c: Packaging Waste Chapter, NI Waste Management Plans
 d: EHS and DARD Waste Surveys

7. In summary, the analyses confirm that significant additional recycling and recovery capacity is required in the municipal, and the commercial and industrial waste sectors (including construction & demolition and packaging wastes) in order to meet the targets and reduce our current heavy reliance on landfill.

Measures and Initiatives for Landfill Reduction

8. A strong framework to support a more sustainable approach to the management of biodegradable wastes is already in place through a range of existing measures and initiatives, summarised in Table 3. These measures, which include a mixture of statutory provisions, economic instruments, policy initiatives and voluntary agreements, are designed to encourage the diversion of wastes from landfill and provide the support necessary to enable the objectives of the Strategy to be delivered. They also recognise that the support and active participation of all those involved in the production and management of biodegradable wastes is needed, if its objectives are to be delivered. This includes the public at the household level, as well as, government departments, local authorities, businesses, NGOs and the voluntary sector.

Table 3: Current Policy Measures and Initiatives

Statutory Instruments	The Producer Responsibility Obligations (Packaging Waste) Regulations The Waste and Emissions Trading Bill ¹
Economic Instruments	Landfill Tax
Policy Instruments	The Waste Management Strategy The Sewage Sludge Strategy
Policy Initiatives	Markets Development Waste Minimisation Education and Awareness Research and Development
Voluntary Agreements	Packaging Waste Retail Partnership
Planning Initiatives	Design Awareness

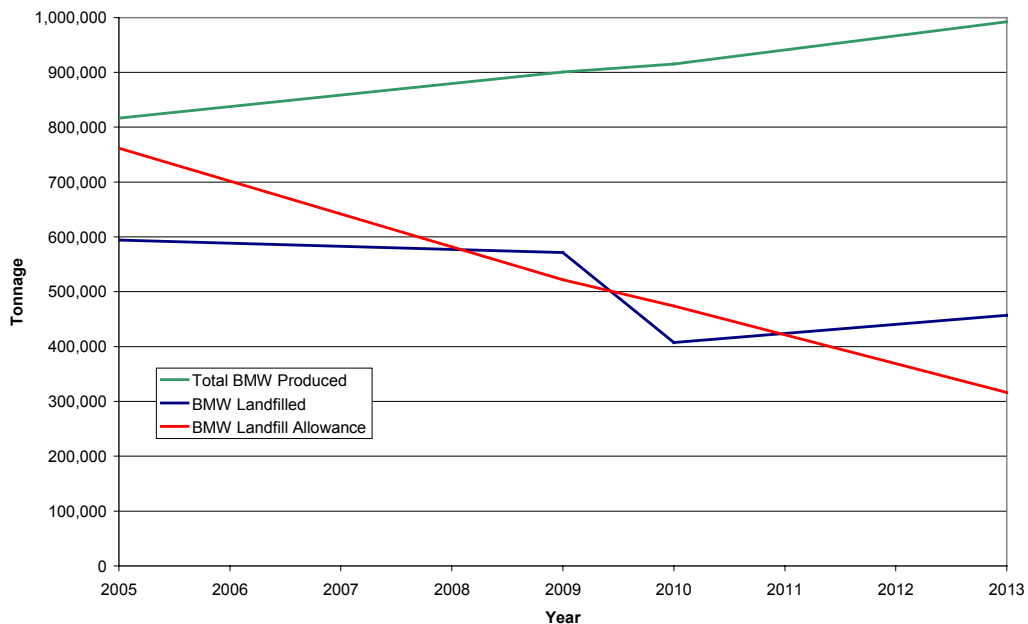
Note: 1. The Waste and Emissions Trading Bill is currently passing through Parliament, having received its third reading in the House of Lords in March 2003.

9. The allowances for the landfilling of biodegradable municipal waste (BMW) at the years identified in the Landfill Directive is given in Table 4. These are based on a biodegradable content of 71% for NI municipal waste as measured in the NI 2000 Waste Characterisation Survey, although the actual allowances may be subject to change following the coming into force of the regulations under WET Bill which will clarify the allowances for NI.

Table 4: Allowances for the Landfilling of Biodegradable Municipal Waste and Quantities

	2010 (tpa)	2013 (tpa)	2020 (tpa)
Total Projected BMW (based on data in Waste Management Plans and 71% biodegradable content)	16,000	93,000	,111,000
BMW Landfill Allowance (based on 1995 figures for Northern Ireland and 71% biodegradable content)	74,000	16,000	21,000

10. The adopted Waste Management Plans all focus on meeting the targets via recycling, recovery, and composting, up to 2010, through the provision of enhanced services and facilities. These measures, which should reduce the quantities of BMW disposed of to landfill, include:
- The increasing provision of source separated collection services;
 - Additional bring banks and civic amenity sites;
 - The collection of green wastes at civic amenity sites;
 - The development of materials recovery, composting and waste transfer facilities; and
 - The development of an anaerobic digestion plant within the arc21 region.
11. An analysis of the capacity provided by the facilities and supporting services identified in waste management plans, to divert biodegradable municipal waste from landfill, is illustrated in Figure 1. This compares the projected quantities of BMW disposed of to landfill, in accordance with the measures set out in the plans, against a straight line interpolation between Landfill Directive Targets over the period 2005 to 2013.

Figure 1: Analysis of the disposal of BMW to Landfill against targets

12. Although the analysis indicates that the 2010 target should be met, it also highlights the limited reserve capacity and the potential vulnerability to changes in circumstances, such as increased waste production, or the non delivery of a service or facility. In such circumstances, there is the risk that the 2010 Landfill Directive Target may not be met. This reinforces the significance to be attached to the proactive monitoring programme outlined in the Waste Management Plans. In addition, the Plans, in their pending reviews, need to identify the facilities required to meet the 2013 and longer term targets to ensure that Northern Ireland fulfils its obligations under the Landfill Directive.

Actions and Commitments

13. The Biodegradable Waste Strategy identifies a series of actions and commitments for the Department, district councils and other stakeholders including other government departments, commerce, industry and the public to build upon the existing range of measures and initiatives. These summarise and extend the commitments set out in the NI Waste Management Strategy and Waste Management Plans to provide further clarity and direction in the drive to manage biodegradable wastes sustainably.

Implementation, Monitoring and Review

14. The implementation of the Biodegradable Waste Strategy will be the subject of ongoing monitoring and review, a process which is seen as fundamental to its success. The purpose of this is to assess progress in the implementation of the initiatives set out in the Strategy; to review their performance and their effectiveness; and to update actions where necessary to

ensure that the Strategy's objectives are achieved. The monitoring and review procedures, based on analysis of Key Performance Indicators, take the form of:

- **Annual Performance Assessments:** To monitor and assess trends and performance regularly, also taking into account information provided by district councils in the Annual Performance Appraisals of the Waste Management Plans.
- **Review of the Strategy:** The first of these will be undertaken by the end of 2005. In conducting these reviews, the Biodegradable Waste Strategy will inform, and be informed by, future reviews of both the Waste Management Plans, and the Northern Ireland Waste Management Strategy.

15. The Department will also work with DEFRA, and the other devolved administrations within the UK, to share information and experiences, and to implement appropriate and timely measures, to assist with the delivery of the Strategy's objectives. Information will also be shared between the respective UK and Irish authorities, in order to establish a co-operative approach to meeting targets.

1 INTRODUCTION

Background and Context

1.1 Biodegradable waste materials are present in many of the wastes produced by society. In Northern Ireland we currently place a heavy reliance on landfill for the disposal of these wastes, the least desirable management option. There is a very real need therefore to effect significant change in our attitude and in our approach to the management of these wastes.

1.2 As one of the measures adopted at a European level to deliver change, the Landfill Directive (1999/31/EC) targets biodegradable wastes, seeking, as a primary objective, to reduce the amount of these wastes disposed of to landfill. Specifically, under Article 5 (1), it requires Member States to:

‘set up a national strategy for the implementation of the reduction of biodegradable wastes going to landfill’

1.3 Biodegradable waste is defined, in this context, as: *‘any waste that is capable of undergoing anaerobic or aerobic decomposition, such as food and garden waste, and paper and cardboard’.*

1.4 This Strategy for the management of biodegradable wastes, (the Biodegradable Waste Strategy), has been prepared in fulfilment of Northern Ireland’s obligations under Articles 5 (1) and 5 (2) of the Landfill Directive (1999/31/EC)¹.

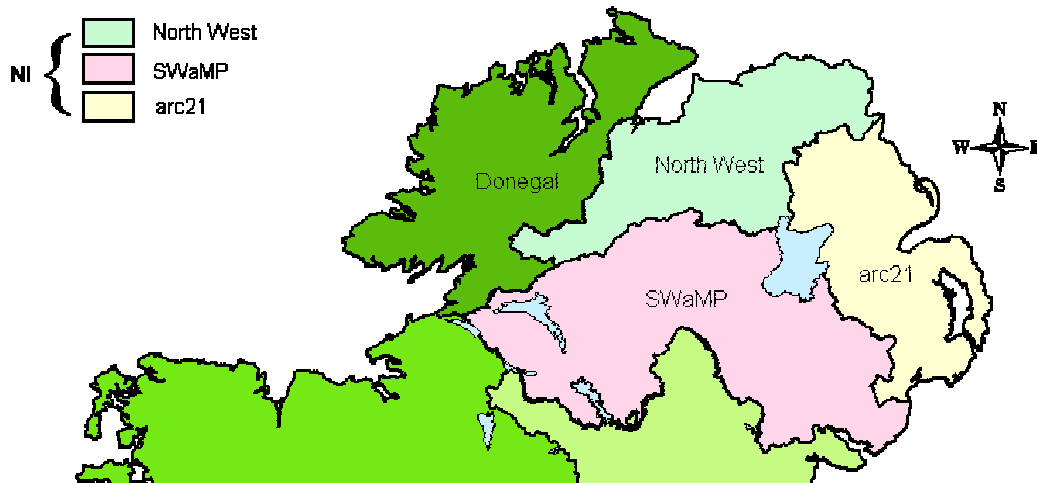
1.5 The Biodegradable Waste Strategy complements, and should be read in association with, the Waste Management Strategy for Northern Ireland, published by the Department of the Environment in March 2000, and seeks to build upon its vision of:

‘Northern Ireland as a European Centre of excellence in resource and waste management.’

1.6 The Biodegradable Waste Strategy also complements the sub-regional Waste Management Plans, prepared by the district councils in fulfilment of their obligations under the Waste Framework Directive, and the Waste and Contaminated Land (NI) Order 1997. In developing these plans, the councils have formed three sub-regional waste planning groups as shown in Figure 1.1, comprising:

- The Eastern Region Waste Management Group (arc21);
- The North West Region Waste Management Group (NWRWMG);
- The Southern Waste Management Partnership (SWaMP).

Figure 1.1 Waste Planning Groups



- 1.7 The Plans implement the policies set out in the Northern Ireland Waste Management Strategy, providing for an integrated network of waste management facilities across Northern Ireland, and identifying targets and actions for all sectors of our community.
- 1.8 The Biodegradable Waste Strategy, along with the Northern Ireland Waste Management Strategy, cuts across a range of sectors and stakeholders, and represents a significant contribution to the overarching principle of Sustainable Development, as set out in the UK and Northern Ireland Sustainable Development Strategies.
- 1.9 This Strategy will inform, and will be informed by, future reviews of both the Waste Management Plans, and the Northern Ireland Waste Management Strategy. In turn, the Strategy will be subject to review as and when the Northern Ireland Waste Management Strategy is reviewed.

Objectives

- 1.10 The primary objectives of the Biodegradable Waste Strategy are to:
- Promote the sustainable management of biodegradable wastes.
 - Comply with Northern Ireland's obligations under Articles 5 (1) and 5 (2) of the Landfill Directive.
- 1.11 The Strategy seeks to achieve these objectives by:

¹ The Waste and Emissions Trading Bill, which is currently passing through Parliament, will transpose the requirements of Articles 5 (1) and 5 (2) of the Landfill Directive (1999/31/EC) into national legislation.

- Identifying the roles, responsibilities and actions needed to manage our biodegradable wastes in a more sustainable manner;
- Defining policy measures and initiatives, supporting those set out in the Northern Ireland Waste Management Strategy, the Waste Management Plans, and elsewhere; and
- Establishing a framework, with key performance indicators, to monitor progress, and to review the effectiveness of the measures set out in the strategy.

1.12 The Biodegradable Waste Strategy needs the support and active participation of all those involved in the production and management of biodegradable wastes, if these objectives are to be achieved. This includes the public at the household level, as well as, government departments, local authorities, businesses, NGO's and the voluntary sector. The Department will seek to ensure that stakeholders, across all sectors, are actively supported by appropriate measures to enable these objectives to be achieved.

1.13 The Department will also work with DEFRA, and the other devolved administrations within the UK, to share information and experiences, and to implement appropriate and timely measures, to assist with the delivery of the Strategy's objectives.

Scope of the Strategy

1.14 As the Strategy seeks to reduce the quantities of biodegradable waste disposed of to landfill, its scope includes the biodegradable fraction of the following waste streams:

- Municipal Wastes
- Commercial and Industrial Wastes
- Packaging Wastes
- Construction and Demolition Wastes
- Sewage Sludge
- Agricultural Wastes

1.15 For the purposes of this Strategy, Municipal Waste is interpreted as *'Household waste, and any other waste under the control of (ie collected by) District Councils, or their agents, acting on their behalf'*. This is consistent with the definition used by the UK for the purposes of providing data to EUROSTAT on its municipal waste arisings in 1995.

2 THE POLICY AND LEGISLATIVE CONTEXT

Introduction

- 2.1 Policy and legislative measures are designed to effect change in our approach to waste management, based on the need to provide high levels of protection to human health and the wider environment, and to manage our resources in a more sustainable manner.
- 2.2 These measures have resulted in a wide, supporting policy and legislative framework reflecting the priority attached to the sustainable management of wastes, with particular emphasis on biodegradable wastes. This framework is outlined below and described further in Annex I.

EU Waste Policy and Legislation

- 2.3 Policy at a European level is founded on a number of over-arching principles, as follows:
- The Waste Management Hierarchy
 - Self-Sufficiency
 - Best Available Technique Not Entailing Excessive Cost (BATNEEC)
 - The Proximity Principle
 - The Polluter Pays Principle (Producer Responsibility)
- 2.4 The main measures that impact directly on the management of biodegradable wastes include:
- ***The Landfill Directive (1999/31/EC)***, which aims to prevent the negative effects of landfilling on the environment, and sets targets for reducing the amount of biodegradable municipal waste disposed of to landfill.
 - ***The Packaging and Packaging Waste Directive (94/62/EC)***, which sets targets for the recycling and recovery of packaging wastes.
 - ***The Regulation on Animal By-Products (1774/2002/EC)***, which sets out requirements for treating animal by-products, the scope of which includes kitchen, catering and restaurant wastes.
- 2.5 In addition to the above, a draft Directive, entitled *The Biological Treatment of Biowaste*, is currently under development as a Working Document. This promotes the separate collection, composting, treatment and beneficial use of biowastes, in order to reduce the negative impacts of these wastes on the environment.

Northern Ireland Waste Policy and Legislation

- 2.6 Waste management policy and legislation in Northern Ireland reflect EU principles and requirements, but also incorporate the concept of Best Practicable Environmental Option (BPEO) into the decision-making process. The main policy and legislative measures include:
- **The Waste and Contaminated Land (NI) Order 1997**, and associated Regulations, which implement the requirements of the Waste Framework Directive.
 - **The Northern Ireland Waste Management Strategy (March 2000)**, which sets out a series of policies, supporting measures and targets, appropriate to the Northern Ireland context.
 - **Waste Management Plans (January 2003)**, prepared by the three sub-regional waste management planning groups, setting out arrangements for the recovery, treatment and disposal of controlled wastes.
 - **The Producer Responsibility Obligation (Packaging Waste) Regulations (NI) 1999**, implementing the Directive on Packaging and Packaging Waste, including targets.
- 2.7 Anticipated legislative provisions that will impact on the management of biodegradable wastes also include the Waste and Emissions Trading Bill, which is currently progressing through Parliament. This will set statutory targets, incorporating the Landfill Directive targets, through to 2020, for the diversion of Biodegradable Municipal Waste from landfill. Compliance with the targets will be the responsibility of district councils.
- 2.8 The Northern Ireland Waste Management Strategy is based on a range of guiding principles that are designed to implement its statutory objectives. These key principles include:
- The Waste Management Hierarchy.
 - Best Practicable Environmental Option (BPEO).
 - Best Available Technology Not Entailing Excessive Costs (BATNEEC).
 - The Polluter Pays Principle.
 - The Proximity Principle.
 - Self Sufficiency, at a national, and as far as practicable, at a regional and sub-regional level.
- 2.9 The Strategy sets a series of Primary and Secondary Targets, for a range of waste streams, and stakeholders, which are shown in Table 2.1. The Strategy is the subject of a formal review commencing in 2003.
- 2.10 In achieving these targets, and those set out in the Landfill Directive, the Strategy states that recycling, composting, recovery, energy from waste and landfill are all necessary elements in the integrated network of facilities needed to meet our future obligations.

Table 2.1 Northern Ireland Waste Management Strategy Targets

<p>Primary Targets</p> <ol style="list-style-type: none">1. Recover 25% of household waste by 2005.2. Recover 40% of household waste by 2010, of which 25% shall be by recycling or composting.3. Reduce the landfilling of industrial and commercial wastes to 85% of 1998 levels by 2005.4. Reduce the quantities of biodegradable municipal wastes being landfilled to 75% of 1995 baseline levels by 2010, 50% by 2013 and 35% by 2020. <p>Secondary Targets</p> <ol style="list-style-type: none">5. Stem the increase in waste arisings per household, returning to 1998 levels by 2005 and thereafter reduce arisings by 1% every three years.6. Each district council to set out in a Waste Management Plan provision for recycling or composting 15% of their household waste arisings by 2005.7. The Department to specify, and introduce in 2002, a mandatory recycled content for selected products and materials purchased.8. Recover a minimum of 50% of packaging waste, of which at least 25% shall be recycled and at least 15% of each packaging material recycled.9. Reduce the quantity of biodegradable municipal waste being landfilled to 85% of 1995 levels by 2005.10. The Department to reduce its overall paper use by 10% by 2002.11. Recover a minimum of 85% of the materials in End of Life Vehicles by 2005 and a minimum of 90% by 2015.12. Recover a minimum of 90% of large Waste Electrical and Electronic Equipment (WEEE) by 2004 and a minimum of 70% of small WEEE.13. Recover 85% of waste tyres by 2005 and 100% by 2010.14. Reduce the amount of construction and demolition waste landfilled to 85% of 1998 levels by 2005.

2.11 The Northern Ireland Waste Management Strategy therefore defines roles and responsibilities, and identifies Key Actions for all stakeholders involved in the management of our wastes. It provides the policy platform to help us develop the range of services and facilities to meet the needs of our community and to meet our wider obligations, by implementing the necessary actions through the Waste Management and Land-Use Development Planning systems.

- 2.12 The Waste Management Plans, which implement the Waste Management Strategy, recognise that waste planning is a dynamic process, which will continue to evolve as measures are enacted, and our attitudes to waste, and associated practices and technologies, change in the light of further information, research and debate. The Plans therefore seek to put in place the initial building blocks in the move to more sustainable waste management, and provide a framework for future planning and implementation, by defining a series of objectives, and identifying associated actions. In broad terms, the main objectives of the three Plans are to:
- Build upon existing resources and services;
 - Meet statutory obligations and targets over the plan periods;
 - Minimise the quantities of waste produced within each sub-region;
 - Increase the re-use, recycling, composting and recovery of wastes;
 - Provide for adequate disposal capacity to meet future needs;
 - Encourage self-sufficiency, as far as practicable, at a sub-regional level;
 - Set criteria for the siting and development of waste facilities;
 - Ensure that future waste management arrangements are developed and implemented in accordance with the principle of Best Value;
 - Achieve economies of scale in order to produce economic benefits; and
 - Promote awareness through education, consultation and participation.
- 2.13 The Councils in all three Groups adopted their respective Waste Management Plans, by January 2003. The implementation of these Plans is subject to ongoing monitoring by the Councils, and they will be subject to periodic review.

Targets

- 2.14 The main targets that impact on biodegradable wastes are summarised in Table 2.2, and include targets set out in the Landfill Directive, the Packaging Waste Regulations, and the Northern Ireland Waste Management Strategy.
- 2.15 Of these measures, the Landfill Directive is the key driver for change. It not only sets targets to limit the quantities of Biodegradable Municipal Waste (BMW) that can be disposed of to landfill, but it will impact on all wastes that are landfilled through its other requirements, including the categorisation of landfills as inert, non-hazardous, and hazardous, the ban on co-disposal, and the ban on disposal of liquid wastes.
- 2.16 Legislative and policy instruments therefore will increasingly be significant drivers for change across a range of waste streams, with a series of measures and targets designed to limit the quantities of biodegradable wastes disposed of to landfill, and promote increased levels of recycling, composting and recovery of these materials.

Table 2.2 Summary of Key Targets Affecting Biodegradable Waste

Landfill Directive:

To reduce the quantity of Biodegradable Municipal Waste disposed of to landfill to:

- 75% of 1995 levels by 2010;
- 50% of 1995 levels by 2013; and
- 35% of 1995 levels by 2020.

Packaging Wastes/Producer Responsibility:

The proposed targets for 2008 are as follows:

- Recovery: 60%; and
- Recycling: 55% to 80% overall, with material specific targets for paper and cardboard of 60%, and 15% for wood.

The NI Waste Management Strategy:

Primary Targets include:

- Recover 25% of household waste by 2005;
- Recover 40% of household waste by 2010, of which 25% shall be by recycling or composting; and
- Reduce the landfilling of industrial and commercial wastes to 85% of 1998 levels by 2005.

3 SOURCES AND COMPOSITION OF BIODEGRADABLE WASTE

3.1 Biodegradable materials make up a proportion of the major waste streams that we produce. This is illustrated in Table 3.1, where the biodegradable proportion of the total waste stream, the main biodegradable components, and their sources, are summarised.

Table 3.1 Summary of Biodegradable Waste Types and Composition

Waste Stream ¹	Sources	Biodegradable Proportion of Total Wastes ²	Biodegradable Components
Municipal Waste	Household and Commercial Premises	71% ^a	Catering (kitchen) wastes Paper and Cardboard Green (garden) wastes
Commercial and Industrial Wastes	Commercial and Industrial Premises	Commercial: 80% ^b Industrial: 50% ^b	Food processing wastes Edible oil and fat Catering (kitchen) wastes Paper and Cardboard Wood Textiles
Packaging Wastes	Household, Commercial and Industrial Wastes	53% ^c	Paper and Cardboard Wood
Construction and Demolition Wastes	New-build Construction Demolition Works	1% ^d	Wood
Sewage Sludge	Waste Water Treatment Works	100%	Sewage Sludge
Agricultural Wastes	Agricultural, horticultural and associated premises	99% ^d	Manure and Slurries Straw and vegetable waste Paper and Cardboard Fallen Livestock

Notes: 1. For definitions, refer to the Glossary of Terms
 2. Estimated biodegradable proportions estimated on the basis of data from:
 a: NI 2000 Waste Characterisation Study
 b: The National Waste Strategy for Wales
 c: Packaging Waste Chapter, NI Waste Management Plans
 d: EHS and DARD Waste Surveys

4 BIODEGRADABLE MUNICIPAL WASTE

Current Waste Production

4.1 Municipal waste is the waste collected by district councils, or their agents, and consists primarily of household waste and some limited commercial waste. The most recent data on municipal waste production for Northern Ireland are summarised in Table 4.1.

Table 4.1 Municipal Waste Production¹

Waste Stream	1998/1999	1999/2000	2001²
Total Municipal Waste	959,954	1,003,736	1,056,298
Biodegradable Municipal Waste (BMW)	682,000	713,000	750,000

Notes: 1. The data are from waste data studies published by EHS.

2. The data for year 2001 refers to the calendar year and is subject to final verification as at April 2003.

4.2 The quantities of biodegradable municipal waste (BMW) have been calculated assuming a biodegradable content of 71%, as indicated by the waste analysis study undertaken by NI2000 during 2000, and on the assumption that the commercial wastes have a similar biodegradable content as household wastes. This is considered a reasonable working assumption, given the dominance of paper and cardboard in the commercial wastes collected by district councils.

4.3 The average annual growth in municipal wastes over the period 1998 to 2001, as covered by the data studies, is about 3.6% per annum.

Current Management Practices

4.4 The estimated quantities of BMW recycled and composted in 2001 are summarised in Table 4.2. A total of some 70,000 tonnes of BMW were reported as having been recycled or composted, equating to an overall recycling/recovery rate of 8.8% for this waste stream. Of this, 40,000 tonnes were composted, and 30,000 tonnes recycled, equivalent to recovery and recycling rates of 5.2% and 3.6%, respectively.

Table 4.2 Quantities of Biodegradable Municipal Waste Recycled and Composted in 2001

Description	Quantity (tpa)	Treatment Rate (%)
Total BMW Arising	750,000	
BMW Recycled	30,000	3.6%
BMW Composted	40,000	5.2%
Total BMW Recycled & Recovered	70,000	8.8%
BMW Landfilled	680,000	91.2%

Notes: 1. Source: EHS Waste Arisings Survey 2002
2. Figures are rounded to the nearest '0,000 tonnes.

- 4.5 The information from EHS's waste data surveys, and the Waste Management Plans have indicated an ongoing general improvement in recycling/recovery rates, counterbalanced by an overall growth in wastes arisings. However, the 2001 data also confirms the continuing reliance on landfill as the most common management option for these wastes, with over 90%, or some 680,000 tonnes, estimated to have been landfilled at that time.

Future Waste Production

- 4.6 The projected future municipal waste arisings, at key target dates, are summarised in Table 4.3, based on the projections included in the sub-regional Waste Management Plans. This includes data for both the total and biodegradable municipal waste arisings, and equates to an estimated average growth rate of 2.4% across Northern Ireland. This is less than the 3.6% measured over the last three years, but reflects the Plans' implementation of waste minimisation measures to stem the increase in waste arisings.

Table 4.3 Projected Future Arisings

Description Year	2005 (tpa)	2010 (tpa)	2013 (tpa)	2020 (tpa)
Total Projected MSW	1,150,000	1,290,000	1,398,000	1,649,000
Total Projected BMW	817,000	916,000	993,000	1,171,000

Notes 1. Sources: The NWRWMG, SWaMP and arc21 Waste Management Plans.
2. Figures are rounded to the nearest '000 tonnes.

Targets and Capacity Requirements

- 4.7 The primary targets that apply to Biodegradable Municipal Waste are the statutory landfill diversion targets set out in the Landfill Directive². These are to reduce the quantity of BMW disposed of to landfill to:
- 75% of 1995 levels by 2010;
 - 50% of 1995 levels by 2013; and
 - 35% of 1995 levels by 2020.
- 4.8 The Landfill Directive targets apply to the United Kingdom as a whole, but for the purposes of quantifying Northern Ireland's share of these targets for, the 1995 NI baseline figure for municipal waste is 890,000 tonnes, and the biodegradable content of the waste is taken as 71%.
- 4.9 The Waste Management Strategy also sets non-statutory targets for household waste, the primary component of municipal waste, as follows:
- Recover 25% of household waste by 2005; and
 - Recover 40% of household waste by 2010, of which 25% shall be by recycling or composting.
- 4.10 These sets of targets are complementary, with progress towards the Strategy targets contributing towards compliance with the Landfill Directive targets. Additional waste treatment capacity, over and above that currently in place, is however needed to meet the targets. The total capacity requirements at the key target dates are summarised in Table 4.4. In this context, waste treatment includes recycling, composting, anaerobic digestion, thermal treatment, or any other appropriate process, that diverts BMW from landfill disposal.

Table 4.4 BMW Landfill Allowances and Treatment Capacity Requirements

Description Year	2005 (tpa)	2010 (tpa)	2013 (tpa)	2020 (tpa)
Total Projected BMW	817,000	916,000	993,000	1,111,000
BMW Landfill Allowance ²	684,000	474,000	316,000	221,000
% BMW Landfilled	83.7%	51.7%	31.8%	18.9%
Total Capacity Requirement ³	133,000	442,000	677,000	950,000
Additional Capacity Requirement ⁴	63,000	372,000	607,000	880,000
% BMW Recycled/Recovered	16.3%	48.3%	68.2%	81.1%

Notes: 1. Figures are rounded to the nearest '000 tonnes.
 2. The BMW landfill allowance is the maximum amount of BMW permitted to be landfilled in that year.
 3. Total capacity refers to the amount of BMW to be diverted from landfill, by recycling, composting or other appropriate treatment.

² Targets will be transposed in Northern Ireland via the UK-wide Waste and Emissions Trading Bill, currently going through Parliament (April 2003) and expected to be enacted during 2003.

4. *Additional capacity refers to the extra management capacity required, over and above the 70,000 tonnes available in 2001, to divert BMW from landfill.*

5 COMMERCIAL AND INDUSTRIAL WASTES

Current Waste Production

5.1 The estimated quantities of the total and biodegradable C&I wastes produced in 2001 are summarised in Table 5.1. The total C&I waste data are taken from the Phase 2 study of C&I wastes commissioned by EHS in 2002, whereas the adopted Waste Management Plans based their estimates of C&I wastes on the previous EHS Phase 1 study of C&I wastes (1999/2000), and acknowledged the need for improved data in this area. However, no significant increase was identified in the intervening period between the two surveys. On the basis of the most recent data, sectorally, commerce produces most waste, accounting for 82% of the total, with industry accounting for 17%, and utilities 1%.

Table 5.1 C&I Waste Production in 2001

Waste Source	Total C&I Wastes (Tonnes)	Assumed Biodegradability	Biodegradable C&I Wastes (Tonnes)
Commerce	520,500	80%	416,400
Industry	107,900	50%	54,000
Utilities	6,300	50%	3,100
Total	634,700		473,500

Notes: 1. Source: EHS Industrial and Commercial Waste Production Survey 2002
 2. The data excludes Construction and Demolition Wastes, which, although an industrial waste, are the subject of a separate survey. See also Section 7.
 3. Figures are rounded to the nearest '00 tonnes.

5.2 The composition of C&I wastes cannot be determined directly from available data, although a high proportion, particularly of commercial wastes, is biodegradable. For the purposes of this Strategy therefore, the biodegradability of general commercial and industrial wastes has been assumed to be 80% and 50% respectively, based on data from the National Waste Strategy for Wales.

Current Management Practices

5.3 The current methods adopted for the management of C&I wastes are summarised in Table 5.2. In this table, the quantities of biodegradable C&I waste are based on the assumption that the proportion of biodegradable wastes is constant, irrespective of the waste management method adopted.

Table 5.2 Waste Treatment Methods for C&I Wastes in 2001

Method of Treatment ¹	Proportion (%)	Total C&I Wastes (Tonnes)	Biodegradable C&I Wastes (Tonnes)
Recycled or Re-used	33%	207,800	155,000
Incinerated or burned ²	19%	120,000	89,500
Spread onto or injected into land	2%	14,500	10,800
Other treatment	6%	40,800	30,400
Landfill	40%	251,600	187,700

Notes: 1. Source: EHS Industrial and Commercial Waste Production Survey 2002
 2. 'Incineration' means burning under controlled conditions in a specially designed furnace. 'Burning' is uncontrolled combustion, for example, in a wood burning stove, or on a bonfire.

5.4 Landfill disposal is the most widely used method, accounting for some 40% of C&I wastes, with 33% recycled. This indicates that nearly 190,000 tonnes of biodegradable C&I wastes were landfilled, and some 155,000 tonnes were recycled.

Future Waste Production

5.5 Trends in C&I waste arisings are difficult to establish from existing data surveys. Between the 1999/2000 and 2001 surveys, no significant increase was detected, but it is acknowledged that the statistical reliability of the current data is uncertain. A working assumption of 1% was used for the arc21 Plan, and this is considered reasonable for the purposes of this Biodegradable Waste Strategy. The projected future C&I waste arisings therefore are summarised in Table 5.3, for the Landfill Directive target years.

Table 5.3 Projected C&I Waste Production to 2020

Waste	2005	2010	2013	2020
Total C&I Waste	660,000	694,000	715,000	767,000
Biodegradable C&I Waste	493,000	518,000	534,000	572,000

Note: 1. Figures are rounded to the nearest '000 tonnes.

5.6 Future surveys of C&I waste arisings, to be carried out on a regular basis, will be used to refine these projections. The timing of future surveys in Northern Ireland will be co-ordinated with other surveys in England, Wales and Scotland, to provide a comprehensive database across the UK. Updated figures and trends will be included in the forthcoming reviews of the Waste Management Strategy and Waste Management Plans, scheduled to be completed in 2005.

Targets and Capacity Requirements

- 5.7 The Landfill Directive targets, set out in Article 5 (2), will apply to that proportion of commercial waste included within the municipal waste stream. That part of the C&I waste stream therefore is included in the analysis of the municipal wastes (Section 4), as is the capacity requirements needed to comply with those targets.
- 5.8 Similarly, packaging wastes arising within the commercial and industrial sectors are included within the analysis and actions identified to achieve compliance with the obligations under the Producer Responsibility/Packaging Waste Regulations.
- 5.9 Compliance with both the Landfill Directive requirements and the Regulations for packaging wastes will result in a reduction of biodegradable C&I wastes disposed of to landfill.
- 5.10 In addition to the above, the Waste Management Strategy sets a target for C&I waste, as follows:
- To reduce the landfilling of industrial and commercial wastes to 85% of 1998 levels by 2005.
- 5.11 It is estimated that approximately 270,000 tonnes of C&I waste were landfilled in 1998, of which some 200,000 tonnes were biodegradable. Therefore, compared with 2001, compliance with this target requires the capacity to divert a further 50,000 tonnes of C&I wastes from landfill, of which some 37,000 tonnes are estimated to be biodegradable. Measures to achieve this target include waste minimisation, and/or increased recycling and recovery, policies for which are set out in the Waste Management Plans.

6 PACKAGING WASTE

Current Waste Production

6.1 Wood, paper and cardboard, are the main biodegradable components in the packaging waste stream, the estimated quantities of which are summarised in Table 6.1. These figures are taken from the adopted Waste Management Plans, which provided a common assessment of the packaging waste stream in Northern Ireland, based on data for the year 2000. The data indicate that paper and cardboard represents some 44% of the total packaging waste at approximately 180,000 tonnes, with wood accounting for 9% at 37,000 tonnes. Commerce and industry also generate higher quantities of packaging waste than households, both with respect to the total packaging waste generated, as well as the biodegradable fraction.

Table 6.1 Biodegradable Packaging Waste Production in 2000

Material	Commercial and Industrial (Tonnes)	Household (Tonnes)	Total (Tonnes)
Total Packaging	229,000	183,000	412,000
Paper and Cardboard	124,000	57,000	181,000
Wood	37,000	0	37,000
Biodegradable Packaging Waste	161,000	57,000	218,000
Biodegradable Proportion	70%	31%	53%

Source: Packaging Waste Chapter, arc21, SWaMP and NWRWMG Waste Management Plans

6.2 Overall, 53% of the packaging waste produced is estimated to be biodegradable, as shown above. However, there is a marked difference in the biodegradability of packaging waste produced by commerce and industry, 70% of which is biodegradable, compared with household packaging waste, which is estimated to be 31% biodegradable. This is explained in part by the quantities of wood in the commercial and industrial streams, where timber pallets and crates are widely used for transporting goods.

Current Management Practices

6.3 There is limited data quantifying the amounts of packaging wastes managed by the different treatment methods, as a significant proportion of the packaging waste generated in Northern Ireland is dealt with by reprocessors located in Great Britain. Under current reporting requirements a separate total therefore is not available for Northern Ireland alone, as the figures are reported on a UK basis.

6.4 The quantities of packaging waste accounted for by NI accredited reprocessors and exporters, who make returns to EHS under the Packaging Waste Regulations, are summarised in Table 6.2. Approximately 51,000 tonnes of the total packaging wastes were accounted for by NI reprocessors and exporters during the year 2000, which is 12.4% of the total produced. Of the biodegradable packaging wastes, only 3.1% in total is accounted for, with just over 1% of the paper and cardboard packaging, and 11% of the wood packaging.

Table 6.2 Packaging Wastes accounted for by NI Accredited Reprocessors and Exporters¹

Packaging Material	Quantity Reprocessed¹ (Tonnes)	Quantity Exported¹ (Tonnes)	Total Accounted For¹ (Tonnes)
Paper and Cardboard	676	1,843	2,519
Wood	4,256	0	4,256
<i>Total Biodegradable</i>	<i>4,932</i>	<i>1,843</i>	<i>6,775</i>
Total Packaging	41,943	9,064	51,007

Notes: 1. Source: Packaging Waste Chapter, arc21, SWaMP and NWRWWMG Waste Management Plans
2. Data relate to the Year 2000.

6.5 Packaging waste is managed as part of the C&I and household waste streams. Based on the treatment methods for the these waste streams, an estimate of the quantity of biodegradable packaging waste treated by different methods within Northern Ireland is given in Table 6.3.

Table 6.3 Waste Treatment Methods for Biodegradable Packaging Wastes in 2000

Method of Treatment	Proportion (%)	Quantity (Tonnes)
Recycled or Recovered	27%	59,000
Other ¹	20%	43,000
Landfill	53%	116,000

Note: 1. 'Other' includes energy recovery, burning and re-use.

6.6 Landfill disposal is estimated to be the most widely-used method, accounting for more than half, some 53%, or nearly 120,000 tonnes, of biodegradable packaging wastes, with just over a quarter, 27%, or some 60,000 tonnes, recycled.

Future Waste Production

6.7 Projections of the trends in the quantity and nature of packaging in the UK as a whole up to 2006³ indicate that although a slight increase in total packaging is predicted, paper and cardboard is expected to be static, with the use of wood packaging decreasing, at a rate of 2.8% per annum. Applying these projections to the quantities of waste produced, and assuming stabilisation at 2006, the predicted quantities of biodegradable packaging waste are summarised in Table 6.4.

Table 6.4 Projected Biodegradable Packaging Waste Arisings

	2005 (tpa)	2010 (tpa)	2013 (tpa)	2020 (tpa)
Projected Biodegradable Packaging Waste	213,000	212,000	212,000	212,000

Note: 1. Figures are rounded to the nearest '000 tonnes.

Targets and Capacity Requirements

6.8 The key requirements that apply to packaging wastes are set out in the Producer Responsibility Obligation (Packaging Waste) Regulations (NI) 1999, which implement the EU Directive on Packaging and Packaging waste, and sets out the measures by which targets for the recycling and recovery of packaging waste are to be achieved. The current targets require that between 50% - 65% of packaging waste be recovered; between 25% - 45% be recycled; and a minimum of 15% of each packaging material recycled. A Common Position has been reached within the EU so that the current targets will be revised to achieve an overall recovery rate of 60%, and a recycling rate of 55 to 80%, with material specific targets for paper and cardboard, and wood, of 60% and 15% respectively. These targets are to be achieved by the end of 2008. These targets supersede the targets for packaging waste set in the Northern Ireland Waste Management Strategy.

6.9 The targets apply to the UK as a whole, but under the Producer Responsibility/Packaging Waste Regulations, obligations are imposed on individual businesses, which meet set criteria, in terms of turnover, and quantities of packaging waste handled. Additional capacity requirements therefore cannot be determined separately for Northern Ireland, but compliance with the targets by businesses will increase the quantities of biodegradable packaging waste diverted from landfill.

³ Report of the Task Force of the Advisory Committee on Packaging, DEFRA, November 2001.

6.10 The Landfill Directive targets will apply to all packaging wastes that arise within the municipal waste stream. Those packaging wastes are deemed to be included in the analysis of the municipal wastes, as is the capacity requirements needed to comply with those targets. Therefore, compliance with the Landfill Directive targets will also result in a reduction of biodegradable packaging wastes disposed of to landfill.

7 CONSTRUCTION AND DEMOLITION WASTES

Current Waste Production

7.1 The estimated quantities of C&D wastes, and the biodegradable (wood) fraction, accounted for at licensed and exempted waste management facilities in 2001 are summarised in Table 7.1. This data is derived from a study of C&D wastes, commissioned by EHS in 2002, which has provided an updated estimate of C&D waste production, compared with the C&D data in the adopted Waste Management Plans, which, in the absence of NI specific data, were based on comparative assessments. The Plans did however acknowledge the need to improve the availability and reliability of data, which the waste surveys are addressing, on the basis of an ongoing programme.

Table 7.1 Summary of C&D Waste Production¹

Waste	Description	Total ²
C&D Wastes	Total	800,000 tpa
Biodegradable C&D Waste	Wood Proportion of Total C&D Wastes	12,000 tpa 1.5%

Notes: 1. Source: Construction and Demolition Waste Survey, EHS, January 2003.
2. Figures rounded up to the nearest '000.

Current Management Practices

7.2 The options recorded for managing wood waste are summarised in Table 7.2, which illustrates that the vast majority of C&D wood waste, that is accounted for at licensed or exempted facilities, is disposed of to landfill, with only limited recycling and re-use. A key factor in determining the potential for recycling and re-use is the ability to separate out wood from other fractions. This is particularly true for demolition wastes.

Table 7.2 C&D Wood Waste Management Options

Waste	Management Method	Proportion	Quantity (Tonnes)
C&D Wood Waste	Re-Use	3%	300
	Recycling	4%	500
	Landfill	93%	11,200

Future Waste Production

7.3 The quantities of C&D wastes produced are related primarily to the economy, and the associated activity within the construction industry. Whilst it may be anticipated that the quantities of wastes produced would increase as the economy grows, there will be other influencing factors, such as Landfill Tax, and the Landfill Directive, with the categorisation of sites as inert, non-hazardous or hazardous. These factors may balance each other out. In the absence of established trends therefore, it is assumed that C&D waste production will be constant, with wood waste generated at 12,000 tonnes per annum. Future data surveys will refine these figures, and updates will be reported in the reviews of the Waste Management Plans, and the Waste Management Strategy

Targets and Capacity Requirements

- 7.4 The Waste Management Strategy sets a target for C&D waste, as follows:
- Reduce the amount of construction and demolition waste landfilled to 85% of 1998 levels by 2005.
- 7.5 Compliance with the Waste Strategy target requires the capacity to divert a further 2,000 tonnes of C&D wood wastes from landfill per annum. Measures to achieve this target include waste minimisation and/or increased recycling and recovery capacity.

8 SEWAGE SLUDGE

Sewage Sludge Production

- 8.1 In Northern Ireland, the Water Service, an Agency of the Department for Regional Development, has responsibility for the operation and maintenance of our sewage systems, and waste water treatment works, including the management of the sewage sludge produced.
- 8.2 The quantities of sewage sludge that will be produced up to 2015, as forecast in the review of the Water Service Sewage Sludge Strategy, are summarised in Table 8.1. This review has taken account of the increase in sludge production that arises from the implementation of the Urban Waste Water Directive and the discharge standards, set by EHS, based on the environmental needs of the receiving waters.
- 8.3 The figures shows a significant increase between 1997 and 2005, largely due to the additional waste water treatment capacity coming on stream to comply with the Urban Waste Water Directive.

Table 8.1 Summary of Sewage Sludge Production¹

Year	1997	2005	2015
Quantity (tds/a)	32,076	52,860	53,356

Notes: 1. Source: Tables 4.2 and 4.3, Northern Ireland Sludge Strategy Review, Water Service, 2000. (Ref 8.1)

Sludge Management Practices

- 8.4 Of the sewage sludge produced, currently up to 4,400 tds/a of mixed digested sludge is spread to agricultural and forestry land, and 22,000 tds/a is treated by the existing incinerator in Belfast. The balance is 'dewatered' to make a sludge cake, at typically 20% dry solids (ds), and disposed of to landfill. Inorganic ash from the incinerator is also disposed to landfill.
- 8.5 The disposal of sludge cake to landfill, up to an anticipated maximum rate of 27,000 tds/a, will continue until a new thermal treatment plant is commissioned.

Target and Capacity Requirements

- 8.6 There are no specific targets that apply to the disposal of sewage sludge to landfill. However, Water Service's objective, in line with the Review of the Sewage Sludge Strategy, is to have adequate capacity to process all sewage sludge produced within Northern Ireland, thereby effectively removing the need to dispose of sewage sludge to landfill.
- 8.7 A thermal treatment plant, to be located next to the existing incinerator, has been proposed, with the capacity to process 32,000 tds/a of sewage sludge. This second facility, for which an Environmental Statement has been released in January 2003, is currently planned to be on stream by 2007/08, subject to completion of statutory procedures and availability of funding. When built, Water Service will have the capacity to process all sewage sludge produced within Northern Ireland.

9 AGRICULTURAL WASTES

Current Waste Production

9.1 The estimated quantities of biodegradable agricultural wastes produced in Northern Ireland, including slurries, but excluding other liquid wastes, are set out in Table 9.1. These figures represent those wastes, including those produced by housed livestock, that are managed on the farms or other agricultural premises. The livestock figures do not include for un-housed animals, whose excreta are deposited directly onto land while at pasture.

Table 9.1 Summary of Biodegradable Agricultural Waste Production

Waste Stream	Fraction	Total ¹ (ktpa)
Housed Livestock Waste	Farm Yard Manure ²	11,286
	Slurry	4,120
	Sub-Total:	15,406
Crop Residues	Straw (Not baled and removed)	5
	Vegetable Waste	2
	Sub-Total:	7
Packaging	Seed and Feed Bags	2
	Agrochemical and Animal Health	<0.1
	Sub-Total:	2
Other Waste	Fallen Livestock	23
	Total Biodegradable Wastes	15,438

Notes: 1. Data relate to the year 2000 census figures.
2. Manure includes both the weight of excreta and bedding.

Current Management Practices

9.2 Natural agricultural wastes are, by and large, dealt with at the point of origin, i.e. on the farm, with farmyard manures and slurry, produced by housed livestock, managed by landspreading, and crop residues ploughed back into the soil.

- 9.3 Other traditional practices, such as the on-farm burial of fallen livestock, will no longer be acceptable under the pending Animal By-Products Regulations (see also Annex IV).
- 9.4 Packaging wastes fall within the scope of the Producer Responsibility/Packaging Regulations – see Section 6. Those wastes which are collected either by councils or their agents, as part of their service, or by waste management contractors, fall within the scope of the municipal waste or C&I waste stream respectively.
- 9.5 Landfill is not a significant disposal route currently for biodegradable agricultural wastes, with the vast majority of such wastes returned to the land through landspreading. To put this in perspective, it is also estimated that livestock at pasture produce a further 15 million tonnes of excreta per annum. In total, therefore, some 30 million tonnes a year of natural organic ‘waste’, comprising farmyard manure, slurry and excreta, is assimilated by the land at present, under current management practices.

Future Waste Production

- 9.6 The challenges faced by the agricultural industry, and associated sectors is acknowledged in DARD’s Vision Report, and accompanying Action Plan, which together with the Review of the Common Agricultural Policy, may change the nature of our industry and associated practices over time. Such issues will be considered in the future development of an Agricultural Waste Strategy.
- 9.7 For the purposes of this Biodegradable Waste Strategy, however, it is assumed that the quantities of biodegradable agricultural wastes will remain constant, as significant variations in the total numbers of livestock are not anticipated in the foreseeable future.

Target and Capacity Requirements

- 9.8 There are no specific targets that apply to agricultural wastes, and no capacity requirements have been specifically identified. It is recognised however that bringing agricultural wastes within the scope of the controlled waste framework, and other changes occasioned by the implementation of the Regulation on Animal By-Products, the technical requirements of the Landfill Directive, and other pollution control legislation, will affect continuance of current practices. These issues will be addressed in the Agricultural Waste Strategy, and in guidance to be issued by DARD.

10 CURRENT MEASURES AND INITIATIVES

Introduction

- 10.1 The objective of this Biodegradable Waste Strategy is to reduce the amount of biodegradable waste that is disposed of to landfill, consistent with the drive to achieve sustainable resource management. A range of current measures, including policy initiatives, economic instruments and statutory provisions, provide the supporting framework to enable the services and facilities needed to achieve this objective to be delivered.
- 10.2 These measures are designed to encourage the diversion of waste from landfill by influencing specific aspects of the environment within which we manage our wastes, be it through changing the economics of waste disposal, changing our attitudes and behaviour, or imposing statutory requirements, to meet our wider commitments and obligations. This Section therefore provides an overview of current policy measures and initiatives, pertaining to biodegradable wastes, as summarised in Table 10.1, and described further below.

Table 10.1 Current Policy Measures and Initiatives

Statutory Instruments	<ul style="list-style-type: none"> ▪ The Producer Responsibility Obligations (Packaging Waste) Regulations ▪ The Waste and Emissions Trading Bill¹
Economic Instruments	<ul style="list-style-type: none"> ▪ Landfill Tax
Policy Instruments	<ul style="list-style-type: none"> ▪ The Waste Management Strategy ▪ The Sewage Sludge Strategy
Policy Initiatives	<ul style="list-style-type: none"> ▪ Markets Development ▪ Waste Minimisation ▪ Education and Awareness ▪ Research and Development
Voluntary Agreements	<ul style="list-style-type: none"> ▪ Packaging Waste ▪ Retail Partnership
Planning Initiatives	<ul style="list-style-type: none"> ▪ Design Awareness

Note: 1. The Waste and Emissions Trading Bill is currently passing through Parliament, having received its third reading in the House of Lords in March 2003.

Statutory Instruments

- 10.3 The statutory instruments designed to reduce the amounts of biodegradable waste disposed of to landfill include:
- The Producer Responsibility Obligations (Packaging Waste) Regulations (NI) 1999 (the ‘Packaging Waste Regulations’); and

- The Waste and Emissions Trading Bill, which is currently passing through Parliament, and is scheduled to be enacted during 2003.

10.4 The mechanisms by which these measures are designed to achieve their objectives are summarised in Table 10.2.

Table 10.2 Statutory Instruments

The Packaging Waste Regulations		
Target Waste Stream:	Mechanism:	Comment:
Packaging Waste	Statutory targets on obligated businesses for the recycling and recovery of packaging waste, including material specific targets for paper and cardboard, and timber.	The effect of increased levels of recycling and recovery will be to reduce the amount of biodegradable packaging waste disposed of to landfill.
The Waste and Emissions Trading Bill (Scheduled for enactment in 2003)		
Target Waste Stream:	Mechanism:	Comment:
Biodegradable Municipal Waste	Annual statutory targets on district councils , limiting the quantities of biodegradable municipal waste disposed of to landfill.	The quantities of biodegradable municipal waste disposed of to landfill in 2010, 2013 and 2020 are as specified under the Landfill Directive. In other years, the amounts are to be agreed, otherwise a default rule applies.

The Producer Responsibility Obligations (Packaging Waste) Regulations (NI) 1999

10.5 These Regulations, implementing the Packaging and Packaging Waste Directive, are primarily designed to increase the levels of recycling and recovery of packaging wastes, by setting targets which obligated companies have to comply with, either directly or through compliance schemes. With the targets being reviewed, and with increased overall levels of recovery and recycling, together with material specific targets anticipated for 2008, the net effect will be to reduce the quantities of biodegradable packaging waste disposed of to landfill.

The Waste and Emissions Trading Bill (Forthcoming Legislation)

- 10.6 It is recognised that the provisions contained in the WET Bill, which is currently passing through Parliament, may be subject to change. However, as currently framed, it is UK-wide legislation implementing the requirements of Articles 5 (1) and 5 (2) of the Landfill Directive. When in force, this will represent the primary mechanism for reducing the quantities of BMW disposed of to landfill, under which Northern Ireland will be allocated a share of the agreed total for the UK. In Northern Ireland, compliance with the annual targets, and hence the delivery of the range of services and facilities needed, will be the responsibility of district councils.
- 10.7 The Department is determined that Northern Ireland will meet its share of the obligations under the Directive. Following implementation of this primary legislation, secondary legislation will be introduced in Northern Ireland to define the tradable permit system⁴ to limit the amount of BMW disposed of to landfill by district councils. Detailed proposals will be subject to further consultation.

Economic Instruments

- 10.8 The Landfill Tax is an instrument which, when it was introduced in 1996, had rates based on estimates of the environmental externalities (i.e the environmental costs that are not reflected in the market price). In effect, the Landfill Tax is now more of a “behavioural” tax, designed to change the economics of waste management, and reduce our reliance on landfill and encourage a shift towards more sustainable waste management practices.
- 10.9 The Tax is structured into two bands, a low rate for inert wastes, and a high rate for ‘active’ wastes, which includes biodegradable wastes. The high rate tax therefore applies to all the waste streams that fall within the scope of this Strategy, and which are disposed of to licensed landfill sites. The rate for active waste is currently £13/tonne, but with effect from 2004, this is set to escalate at £3/tonne to reach a level of £35/tonne by 2011.
- 10.10 The net effect of the Landfill Tax will be to increase waste disposal costs, and hence should influence the Best Practicable Environmental Option (BPEO) for specific waste streams. This will reduce the reliance on landfill over time, as stakeholders, including businesses and district councils, adjust and seek to limit cost increases.

⁴ Options for limiting the quantities of BMW disposed of to landfill, including a tradable permit system, were set out in EPD’s Consultation Paper, Limiting Landfill, in 2002, and will be finalised in 2003.

Policy Instruments

The Waste Management Strategy

- 10.11 The Waste Management Strategy provides the over-arching framework, setting out policies and targets to reduce the quantities of waste disposed of to landfill (see Section 2, and Annex I). The targets are designed to fulfil two objectives:
- To reflect statutory targets, including those defined by the Landfill Directive, and the Packaging and Waste Directive.
 - To encourage stakeholders to work towards more sustainable waste management practices.
- 10.12 The Waste Management Strategy is implemented through the Waste Management Plans, which identify and develop the actions at district council, business and industry level to meet targets, including the establishment of further sector specific actions and targets for key waste streams.
- 10.13 As district councils, commerce and industry, the stakeholders on whom these obligations are placed, comply with the targets, there will be a reduction in the quantities of biodegradable wastes disposed of to landfill.

The Sewage Sludge Strategy

- 10.14 The Review of the Sewage Sludge Strategy, undertaken by DRD Water Service, has proposed the development of a second thermal treatment plant, to provide additional capacity. This facility, when built, together with the existing incinerator, will ensure that Water Service has adequate capacity to process all sewage sludge produced within Northern Ireland.
- 10.15 When the second facility, currently planned to be on stream by 2007/08 subject to completion of statutory procedures and availability of funding, is commissioned, the routine disposal of sludge cake to landfill from Waste Water Treatment Works will cease.

Policy Initiatives

- 10.16 The primary policy initiatives, designed to promote more sustainable waste management practices and hence contribute to a reduction in the quantities of biodegradable waste disposed of to landfill, include:
- Waste Minimisation;
 - Markets Development;
 - Education and Awareness Programmes; and
 - Research and Development.

Waste Minimisation

- 10.17 Waste minimisation is recognised as a priority area to promote sustainable resource management. Current measures and initiatives include support from InvestNI for a number of collaborative projects to help businesses reduce resource use and improve profitability through cost-effective waste minimisation programmes. Examples include the sectoral Waste Elimination From Textiles (WEFT), regional Armagh and Banbridge, and multi-sectoral TCS Flagship Projects. The potential benefits of such waste minimisation initiatives are highlighted by participating businesses having realised savings equivalent to approximately £1,000 per employee per year. In addition, InvestNI supports the work of Envirowise, a government funded waste minimisation programme that provides advice, guidance and waste minimisation audits for SME's.
- 10.18 InvestNI support for waste minimisation will be doubled in the coming year, with support for further waste minimisation projects, the development of regional waste minimisation clubs, and waste minimisation audits. To deliver this programme, InvestNI will be working closely with other intermediaries such as universities, NGO's, trade organisations and district councils. A programme of training and awareness raising in waste minimisation is also planned for representatives from these sectors.
- 10.19 In addition to the above, a Business Leaders Forum for Waste Minimisation has been established under the auspices of the Waste Management Advisory Board. This Group is responsible for overseeing a Waste Minimisation Programme in the business sector, designed to complement, and build upon the existing measures supported by InvestNI outlined above.

Markets Development

- 10.20 The importance of developing markets for recycled and recovered materials is recognised as a critical factor in achieving a sustainable approach to the management of our wastes. A Markets Development Programme has been initiated, guided by the Reduction, Recycling and Recovery (3R's) Group of the Waste Management Advisory Board, InvestNI and specialist groups. This programme comprises the following strands:
- The Waste and Resources Action Programme;
 - The Waste Management Industry Fund;
 - Education and information;
 - Research and development;
 - Green procurement; and
 - All-island co-operation.

- 10.21 The Waste and Resources Action Programme (WRAP), is a UK wide initiative, supported by the Department, with the objective of creating stable and efficient markets for recycled materials and products. WRAP's work comprises seven programmes; three focus on generic areas, financial mechanisms, procurement, and standards and specifications, including compost standards; and four focus on specific material waste streams, including wood and paper.
- 10.22 WRAP has set UK wide material specific targets for paper and wood, for the period 2003/2004, as follows:
- *Paper:* To support investment that will create new manufacturing capacity to deliver a 500,000 tonnes/year increase in newspaper recycling;
To increase the use of recovered paper in the graphics, printing and writing sector by 180,000 tonnes/year; and
To benchmark the use of recycled paper in this sector and achieve 100% increase in market share.
 - *Wood:* To significantly increase wood packaging recovery; and
To achieve 40% recycling and re-use of C&D wood waste a year.
- 10.23 WRAP's programme in Northern Ireland is supported by a Liaison Officer, whose role is twofold:
- To support WRAP's programmes to ensure they take account of developments and needs in Northern Ireland, including the provision of advice to businesses, and the dissemination of best practice.
 - To progress businesses opportunities identified in Northern Ireland, working closely with InvestNI to provide advice and support to businesses looking to expand in the recycling sector, and looking to convert to recycled feedstock.
- 10.24 The Waste Management Industry Fund was created jointly by EHS and InvestNI to assist businesses in the implementation of projects that support and meet the market development objectives of the Waste Management Strategy. The establishment of the Fund was driven by the economic need to create a sustainable market for reused, recycled and recovered materials. The Fund, which is limited to industrial and commercial organisations only, essentially directs government funding towards the private sector to encourage innovative approaches to building sustainable markets, that contribute to key objectives of the Waste Management Strategy.

- 10.25 Education, information and awareness programmes supporting markets development have a broad remit to engage stakeholders on waste issues, provide statutory and technical guidance, as well as advice on best practice. Dedicated websites have been set up by the Department including www.wakeuptowaste.org and www.ehs.gov.uk to provide a wide range of information to stakeholders. With respect to markets development, these tools provide consumer and business pages, latest news on waste issues and events, information by business sector and by material, and sources of further advice and information.
- 10.26 Research and development, focused on market development, is considered both on a UK and on an all-island basis as part of a co-operative approach. A North South Market Development Steering Group was established in 2002 which seeks to optimise co-operation and priorities. Other areas of initial co-operation include structural initiatives and financial support, standards and specifications, education, awareness and training, and green procurement.
- 10.27 These measures and initiatives are specifically targeted at creating the conditions which support the sustainable recycling and recovery of waste materials. As their scope includes biodegradable wastes, they will result in a reduction of the quantities of biodegradable waste disposed of to landfill.

Education and Awareness Programmes

- 10.28 A twin track approach has been adopted in order to raise awareness about the need to change our attitudes to waste, and to provide information on how we can effect changes at every level. The Department has initiated a Northern Ireland wide 'Wake up to Waste' media campaign to promote reduction, re-use and recycling. This campaign uses a mix of media across Northern Ireland including the development of a dedicated website www.wakeuptowaste.org.
- 10.29 This campaign supports the information and awareness initiatives undertaken at a local level by district councils, through their recycling officers, in accordance with their waste management plans. These complementary measures are designed to:
- Effect change in our behaviour and attitudes to waste in the light of increasing costs, and the current unsustainable, but common practice, of disposal to landfill.
 - Promote awareness of the issues, including new legislation and increasing costs to business and industry, and to encourage forward planning, particularly by SME's, to manage this changing business environment.
 - Provide advice and disseminate information on best practice, to both the public and businesses, through the Councils' network of recycling officers, EHS and InvestNI.

- 10.30 The provision of guidance also forms part of the education and awareness initiative, and includes the development of fact sheets, websites, statutory guidance for measurements and reporting, and guidance on BPEO.

Research and Development

- 10.31 Research and development is a cornerstone of this strategy with the R&D programme comprising three main strands:
- *Data Survey and Studies* – to provide statistically valid and reliable data for forward planning purposes, including measurement of the quantities and assessment of the biodegradable content of different waste streams;
 - *Specialist Working Groups* – to contribute to specialist working groups in the Environment Agency and SNIFFER, on specific aspects of waste management; and
 - *Support for R&D Programmes* – including support for WRAP, and projects within universities and other institutions.

Voluntary Agreements

Taskforce on Packaging Wastes

- 10.32 The Waste Management Plans have identified that future increased targets for the recycling and recovery of packaging wastes will require the recovery of additional packaging waste from the municipal waste stream.
- 10.33 The Department therefore, in conjunction with district councils, is establishing a Taskforce, as recommended in the Waste Management Plans, involving central and local government, businesses, compliance schemes, and other stakeholders. The aim of this taskforce is to develop a voluntary agreement that provides for joint working between commerce, industry and district councils, to support the increased recovery and recycling of packaging wastes.
- 10.34 This voluntary agreement will seek to establish a mutually beneficial and supportive framework, with defined mechanisms and agreed roles and responsibilities, which takes into account issues, barriers and opportunities, including the flow of revenues to organisations contributing to the recycling and recovery of these wastes.

Retail Partnership

- 10.35 A Retail Partnership, between EHS and key retailers throughout Northern Ireland, has been launched in support of the Wake up to Waste campaign. The aim is to communicate to customers and staff the need to reduce waste. The retailers have signed a Charter, which outlines the commitments being undertaken by the participating retailers, and underpins the partnership with Government in working towards the targets for reduction and recovery of waste.

10.36 Co-operation between the United Kingdom and Ireland

Information on the above policies and initiatives are shared between the respective UK and Irish authorities, in order to assist businesses, and establish a co-operative approach to meeting targets.

Planning Initiatives

10.37 The Waste Management Plans for the Southern Waste Management Partnership and the North West Region Waste Management Group have recognised that the land-use planning system can raise awareness and encourage the better use of resources and promote waste minimisation in new development. These Plans therefore have identified a 'Think Waste and Plan' Initiative, to be phased in by the end of 2004. This relates to planning applications for new developments which, when coming before a Council, will be expected to be supported by a statement identifying the nature and quantities of wastes that will be generated during all phases of the development. The purpose of this initiative is to ensure that the management of wastes is considered in the design of all phases of a project's life cycle, maximising the opportunity to minimise waste through design, and create a momentum for re-use and the incorporation of recycled materials into a project.

10.38 This initiative is further reinforced by Planning Policy Statement 11: *Planning and Waste Management*, which includes an Annex promoting:

- Consideration at the initial design stage, by prospective developers, of the waste management implications and requirements for future occupiers of their developments;
- Quantification of the wastes arising from the development during construction and operational phases;
- Identification of measures to minimise the waste generated;
- Re-use of materials on site during the construction/development phase;
- Incorporation of recycling facilities, and the separation, recycling and recovery of waste outputs.

11 INFRASTRUCTURE AND WASTE PLANNING

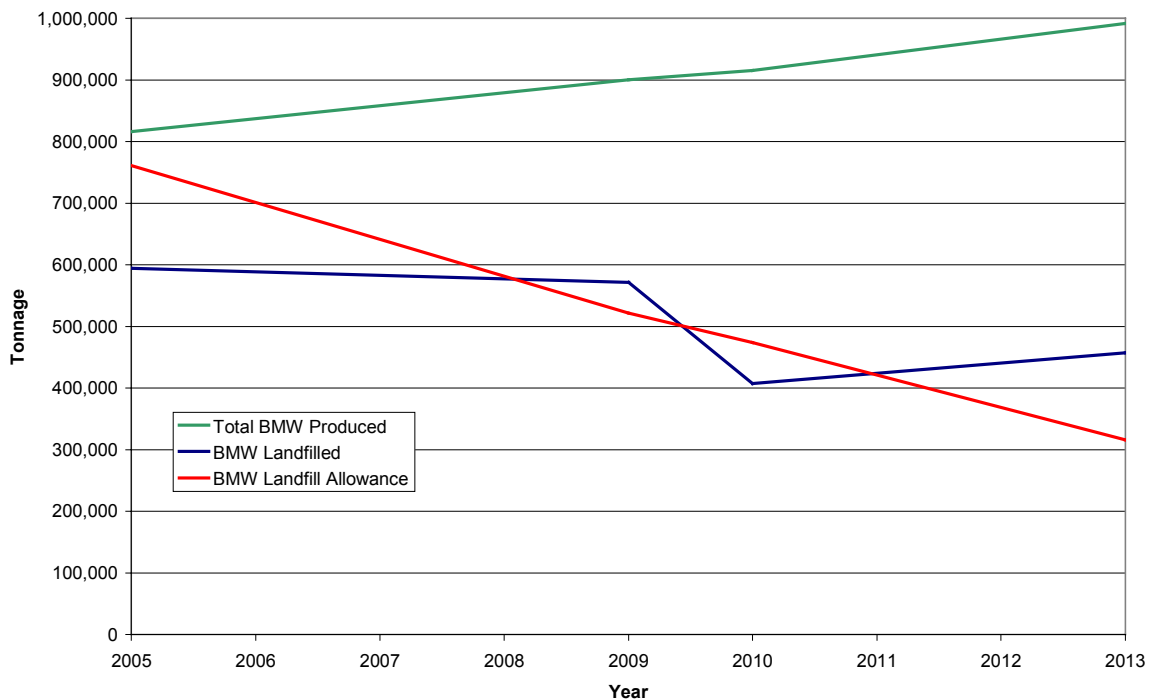
Introduction

- 11.1 The district councils have made provision for additional supporting infrastructure through the Waste Management Plans, in order to meet their targets and obligations. Of particular reference are the landfill diversion targets for biodegradable municipal waste (BMW), which is the primary focus of this Strategy. The facilities identified in the Plans, together with existing sites, form an integrated network of waste management facilities, organised on a sub-regional basis. This network has been designed to ensure that the required capacity is provided to enable the targets to be met, through increased recycling, recovery and composting of biodegradable wastes.
- 11.2 This Section provides an analysis of the capacity provided by the facilities and supporting services identified in the Waste Management Plans, against the statutory targets set out in the Landfill Directive. It also illustrates the number and type of facilities, and their geographical distribution across the region.

Capacity Analysis

- 11.3 The adopted Waste Management Plans all focus on meeting the targets via recycling, recovery and composting, up to 2010, through the provision of enhanced services and facilities. These measures, which should reduce the quantities of BMW disposed of to landfill, include:
- The increasing provision of source separated collection services;
 - Additional bring banks and civic amenity sites;
 - The collection of green wastes at civic amenity sites;
 - The development of materials recovery, composting and waste transfer facilities; and
 - The development of an anaerobic digestion plant within the arc21 region.
- 11.4 The effect of these measures is illustrated in Figure 11.1, which compares the projected quantities of BMW disposed of to landfill in accordance with the measures set out in the Plans, against a straight line interpolation between Landfill Directive Targets for BMW disposal to landfill, over the period 2005 to 2013. This straight line interpolation has been included so that the annual performance can be compared, and progress towards targets measured. The Government intends to introduce statutory annual targets, through the Waste and Emissions Trading Bill, limiting the disposal of BMW to landfill to ensure that the UK meets its targets and obligations under the Landfill Directive. In Northern Ireland, these targets will apply to district councils.

Figure 11.1 Analysis of the Disposal of BMW to Landfill against Targets



11.5 This analysis is based on the assumptions and quantities of waste at the key target dates, set out in the Plans. The proposed implementation programme means that there is a constant reduction in the amount of BMW landfilled, as the measures are rolled out progressively over time, with a step change, as the anaerobic digestion plant is commissioned.

11.6 Although the analysis indicates that the 2010 target has been met, it also highlights the limited reserve capacity and the potential vulnerability to changes in circumstances, such as increased waste production, or the non-delivery of a service or facility. This emphasises the importance attached to the proactive monitoring programme outlined in the Plans.

11.7 This analysis does not, at this time, consider overall compliance with the 2013 and 2020 targets. Rather, the Waste Management Plans have taken a phased approach to delivering the services and infrastructure needed to meet the longer term targets. The arc21 Plan identifies the preferred scenario and facilities that will be required to meet the targets for its sub-region to 2020. A decision will be taken on the precise technology and timing during the review of the plan at 2005. The plans for SWaMP and NWRWVG identify the long term recovery capacity required, and a comprehensive review of the sub-regions' requirements, to enable integrated planning to 2020, has been initiated. This is scheduled to be completed by the end of 2005. These approaches have been adopted, in the light of ongoing developments and emerging technologies, to avoid premature commitments to any particular technology, and to ensure that a wide consensus is developed in achieving the best overall long term solution.

Supporting Infrastructure

- 11.8 As noted previously, the main infrastructure facilities identified in the Waste Management Plans that support the diversion of BMW from landfill, includes:
- Civic amenity sites;
 - Materials recovery facilities;
 - Composting (open windrow and in-vessel) plants;
 - Waste transfer stations; and
 - An anaerobic digestion plant.
- 11.9 The Waste Management Plans identify indicative locations and siting criteria for these, and other infrastructure, to support the planning and procurement procedures that will need to be undertaken to develop the facilities. The geographical distribution of this network of facilities is illustrated in Figures 11.2 and 11.3, for civic amenity sites, and recycling, composting, transfer and anaerobic digestion plants, respectively.
- 11.10 All new (and existing) facilities will be required to meet the appropriate technical and operational requirements, as set out under waste and pollution prevention control legislation (see also Section 2 and Annex I). This will see a step change in operational and management standards, requiring a significant commitment of resources from the operators of facilities.
- 11.11 Overall, therefore the Waste Management Plans provide an integrated network of facilities, providing the capacity needed to meet the targets in 2010. Critical to this is the implementation of the measures set out in the Plans, with ongoing monitoring and review to ensure progress is maintained, including the programme of review to allow the necessary decisions to be made in order to ensure that further infrastructure is developed to meet the targets in 2013 and 2020.

Figure 11.2 Network of Civic Amenity Sites

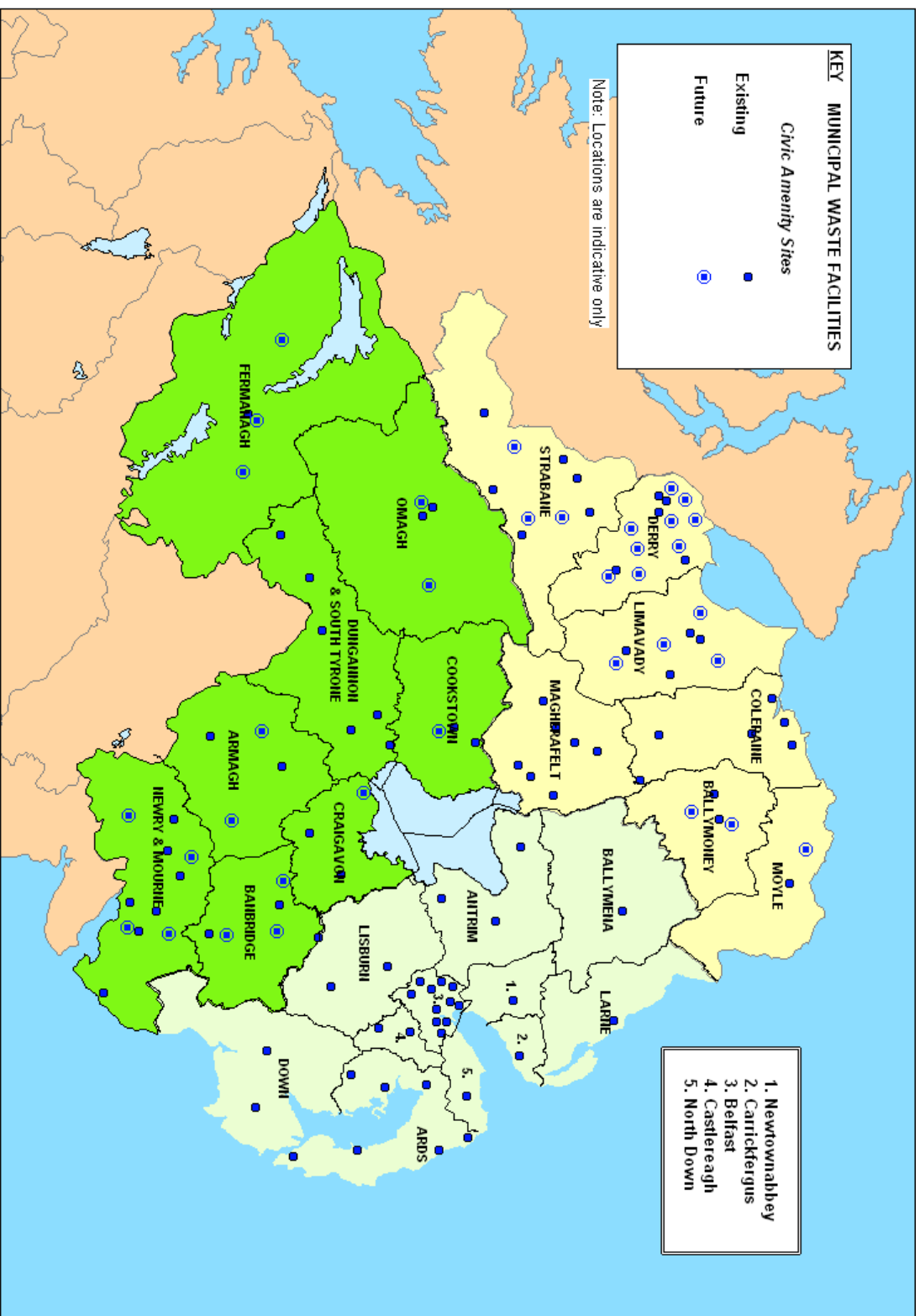
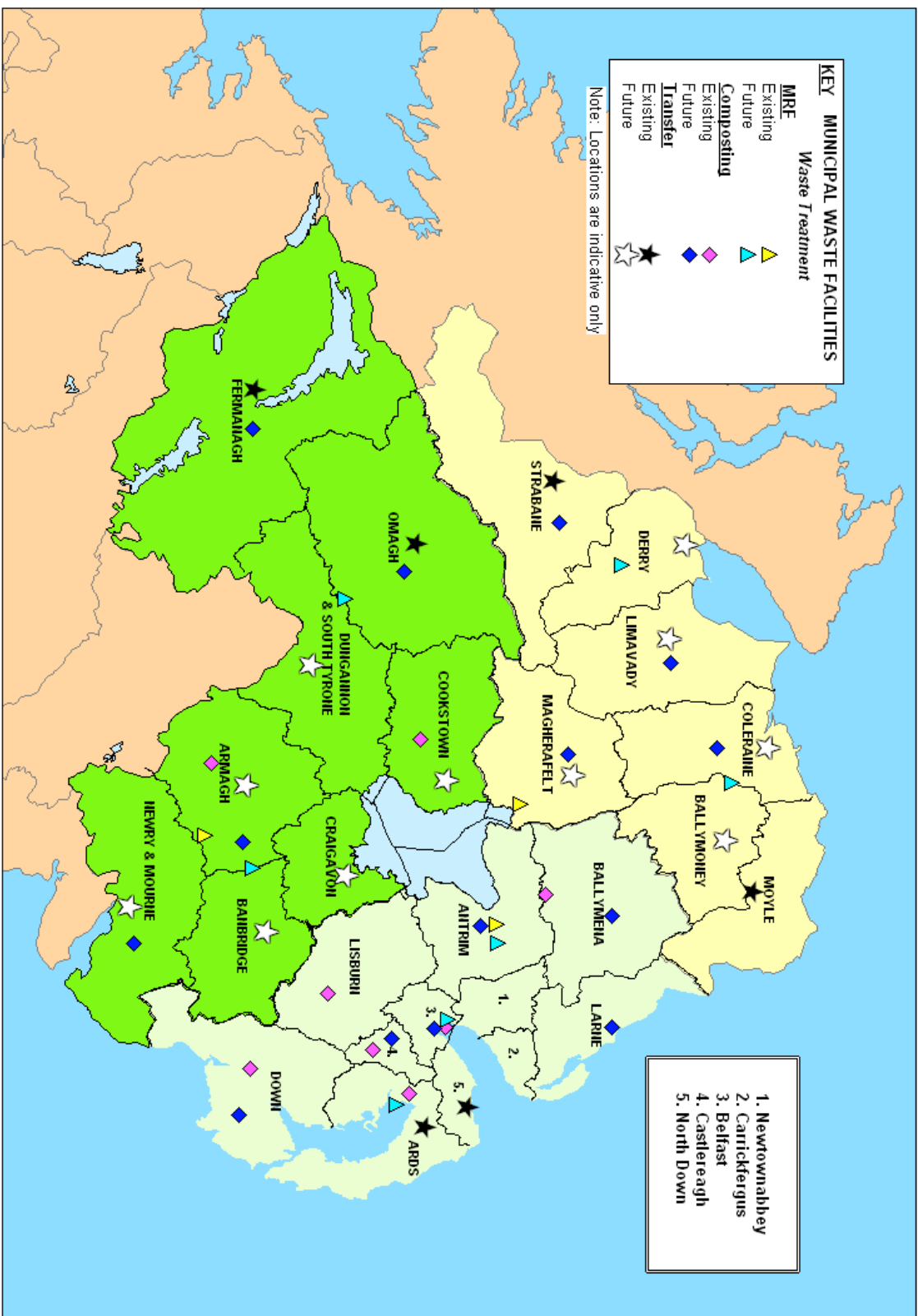


Figure 11.3 Network of Municipal Waste Recovery Facilities



12 ACTIONS AND COMMITMENTS

Introduction

12.1 This Section sets out a series of actions for stakeholders, and commitments for government departments, to provide further clarity and direction on a waste stream specific basis, to the existing range of measures and initiatives. The purpose of this is to ensure that this Strategy provides further support in the drive to manage our wastes sustainably, and reduce our reliance on landfill.

Municipal Wastes

12.2 The Department is to:

- Continue to implement the actions in the Waste Management Strategy that contribute to the sustainable management of wastes, including biodegradable wastes.
- Review the Waste Management Strategy by the end of 2004, in order to: assess overall progress and the engagement and mobilisation of stakeholders; identify barriers, opportunities, future priorities and actions; and review targets, including their objectives, and means of definition.
- Publish guidance for district councils on the trading of landfill allowances under the Waste and Emissions Trading Bill, following the consultation on '*Limiting Landfill to meet the EC Landfill Directive's targets for reducing the landfill of biodegradable waste*'.
- Publish guidance, in association with DARD, on the composting of biodegradable wastes containing kitchen wastes, with reference to the EC Animal By-Products Regulation, and its interpretation and application in Northern Ireland.
- Coordinate an ongoing programme of municipal waste analyses with district councils, to quantify the proportion and amount of biodegradable wastes within the municipal waste stream. This will include the composition of the wastes at the points of collection, treatment and disposal.
- Consider the feasibility of developing a voluntary agreement which utilises the existing distribution and recovery network, for increased recovery of papers and magazines.

12.3 District Councils are to:

- Increase the availability of bring facilities, and introduce source separated household waste and commercial waste collection services, where practicable, to increase the recycling and recovery of biodegradable municipal wastes.
- Monitor and regularly review the quantities of MSW and BMW collected, recycled/recovered, and disposed of to landfill, to assess progress against compliance with statutory targets, and implement corrective actions where needed.

- Review the range, mix and capacity of facilities identified in their Waste Management Plans against the Landfill Directive targets for 2010, 2013, and 2020. This should initially be completed by the end of 2005, and regularly reviewed thereafter, in the light of the best available information and guidance.
- Review their charging mechanisms for the collection of commercial and some household wastes, including garden wastes, with a view to creating incentives for reducing the quantities generated, and encouraging the source-separated collection of materials.
- Encourage the introduction of home composting, where this can reasonably be accommodated in the gardens of properties.
- Work with community groups and the voluntary sector to develop community composting schemes, where appropriate in accordance with the guidance noted above, and where the resulting compost can be used beneficially.
- Undertake an ongoing programme of municipal waste analysis, co-ordinated by the Department, to quantify the proportion and amount of biodegradable wastes within the municipal waste stream, at the points of collection, treatment and disposal.

Commercial and Industrial Wastes

12.4 The need for additional capacity for recycling, and recovering C&I wastes is recognised, as are the potential synergies between the municipal and C&I waste streams. Each of the key stakeholder groups therefore has a role to play, as outlined below, if the opportunities generated by this synergy are to be optimised.

12.5 The Department is to:

- Build upon recent data studies on C&I wastes, seeking to develop reporting systems that provide a traceable and reliable means of quantifying the wastes produced and their treatment destinations.

12.6 DETI, through InvestNI, is to:

- Expand its activities in support of waste minimisation through waste minimisation audits, waste minimisation clubs, providing additional support to the Envirowise programme and local waste minimisation programmes and providing training in waste minimisation techniques for consultants and other intermediaries.

- Support, with EHS, the development of a dedicated web-site or regularly updated CD-Rom to provide the information businesses require, to include:
 - Registered waste carriers
 - Licensed landfill sites, transfer stations and waste treatment facilities
 - Waste recyclers
 - Waste exchangers and brokers
 - Compliance schemes
- Establish a centre of excellence in business environmental issues. This “one stop shop” is to be brought closer to businesses through the InvestNI local office network, and other intermediaries such as district councils, Arena Network, Chamber of Commerce and Trade Organisations.

12.7 District councils are to:

- Seek to provide services and facilities, where appropriate which can be ‘shared’ with commerce and industry, on the basis of appropriate contractual or service arrangements, providing mutual benefits through economies of scale.

12.8 Commerce and industry are to:

- Work with district councils to ensure that the review and development of Waste Management Plans reflect their needs, including identification of the Best Practicable Environmental Option (BPEO) for their specific waste streams, and the scale and location of facilities necessary to provide the support services required.

Packaging Waste

12.9 The Department, in conjunction with the other stakeholders, is to:

- Review current reporting systems for packaging wastes, to improve data on the quantities recycled, recovered, disposed of to landfill, and exported from Northern Ireland. This is to assist in monitoring performance, and identifying priorities and future actions.
- Consider and assess appropriate mechanisms to ensure that revenues are generated for those involved in key points in the packaging waste recycling and recovery chains, including collection and storage, consistent with the principles of Producer Responsibility.

12.10 District councils are to:

- Increase the availability of bring facilities, and introduce source separated household waste collection services, in accordance with the measures set out in the Waste Management Plans, to increase the recycling and recovery of packaging wastes, including biodegradable packaging wastes, from the household waste stream.
- Work with commerce and industry to develop facilities at selected civic amenity sites to accept packaging wastes from SME's, in accordance with the measures set out in the Waste Management Plans.

12.11 Commerce and industry are to:

- Work with and support district councils, where appropriate, and consistent with the principle of Producer Responsibility, in the provision of facilities and services for the recycling and recovery of packaging waste.

C&D Wastes

12.12 Government Departments, Agencies and District Councils are to:

- Incorporate the principles of Sustainable Construction into their major capital works projects including, for example, life cycle analyses, Environmental Management Systems, the separate collection of waste materials on site, and the use of specifications incorporating recycled materials, as appropriate to the scale and nature of the project.
- Nominate a 'champion' for Sustainable Construction within each department, agency, division, organisation or group, as appropriate, to provide a focus for this initiative, and to develop and disseminate the supporting expertise.

12.13 The Department is to:

- Work with the Construction Employers Federation (CEF), professional institutions, trade organisations, and other bodies within the construction industry, to encourage the adoption of sustainable management practices by companies of all sizes across the industry.
- Support WRAP programmes for enhanced recovery of wood waste, including a target to achieve 40% recycling and re-use of C&D wood waste each year.

12.14 Builders and construction companies are to:

- Separate C&D wastes on site, where practicable for collection, treatment or disposal as appropriate on a material specific basis.
- Seek opportunities to maximise the re-use, recycling or recovery of waste materials, including wood, where possible.

Sewage Sludge

12.15 DRD Water Service is to:

- Monitor on an ongoing basis the projected quantities of sewage sludge generated against any requirements that arise from the implementation of the Water Framework Directive.
- Cease routinely disposing of sludge cake to landfill from their Waste Water Treatment Works when the proposed thermal treatment plant is commissioned.

Agricultural Wastes

12.16 The Department and DARD are to:

- Collaborate to develop an Agricultural Waste Strategy, once the scope and definition of the control of agricultural wastes has been clarified.
- Establish a Northern Ireland Forum for Agricultural Waste to provide for: the exchange of views and experiences between stakeholders; the sharing of best practice; advising on priorities and issues; and, monitoring the effectiveness of the Agricultural Waste Strategy and its implementation.
- Continue to develop and co-ordinate their information campaigns on good practices in the safe and sustainable management of waste materials.
- Examine the nature and arisings of agricultural wastes in Northern Ireland, through data studies, research and development (R&D) projects, and pilot studies.
- Assess the capacity of the agricultural sector to sustainably utilise compost from non-agricultural waste sources.

13 IMPLEMENTATION, MONITORING AND REVIEW

Introduction

- 13.1 The implementation of the Biodegradable Waste Strategy will be the subject of ongoing monitoring and review, a process which is seen as an integral component of the Strategy, and fundamental to its success. The purpose of this is to monitor progress in the implementation of the measures and initiatives set out in the Strategy; to review their performance and their effectiveness; and to update actions where necessary to ensure that the Strategy's objectives are achieved.
- 13.2 The Biodegradable Waste Strategy will be reviewed and developed as part of the review and update of the Northern Ireland Waste Management Strategy and Waste Management Plans commencing in 2003.

Annual Performance Assessment

- 13.3 The Department, in monitoring the implementation of the Strategy, and in reviewing its performance will undertake an Annual Performance Assessment, which will:
- Monitor the implementation of the measures and initiatives set out in the Strategy;
 - Monitor trends in waste production, and waste treatment on the basis of the Key Performance Indicators (KPI's);
 - Assess performance against the planned levels, for each of the specified waste streams;
 - Analyse any area where performance has fallen significantly below the planned levels, with a view to identifying the causes and developing appropriate corrective action, in conjunction with stakeholders;
 - Assess the impacts of changes to legislation, guidance, and related policy areas; and
 - Publish an Annual Report on the implementation of the Strategy.
- 13.4 The overall purpose of the Annual Performance Assessment therefore is to allow the Department to monitor progress by measuring the performance of the Strategy against the KPI's, described below.
- 13.5 The Annual Performance Assessment will be completed by the end of September with respect to the preceding calendar year, and will be presented in an Annual Report. The Assessment will also consider the information provided by the Councils in their Annual Performance Appraisals on the Waste Management Plans.

Key Performance Indicators

13.6 The Key Performance Indicators (KPI's) for monitoring of the biodegradable municipal waste stream are set out in Table 13.1, and performance indicators for facilities are set out in Table 13.2. The indicators in Table 13.1 are as reported in the adopted Waste Management Plans. Reporting guidelines for measurement of these indicators are published in Municipal Waste Data Monitoring and Reporting: Interim Guidelines, March 2003 (available on the Departments website, www.ehsni.gov.uk).

Table 13.1 Key Performance Indicators for Biodegradable Municipal Waste

<ul style="list-style-type: none">▪ Household waste recycled and composted as a % of arisings (i.e of total household waste collected);▪ Household waste landfilled;▪ Commercial & industrial waste (collected by district councils) recycled and composted as a % of arisings;▪ Commercial & industrial waste (collected by district councils) landfilled;▪ Municipal waste recycled and composted as a % of total arisings;▪ Municipal waste landfilled;▪ Biodegradable municipal waste (BMW) landfilled; and▪ Total household waste collected per household (from which waste growth rates are also calculated).
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Table 13.2 Performance Indicators for Facilities and Infrastructure

<ul style="list-style-type: none">▪ Number of home composting units issued by District Councils;▪ Number and capacity of composting facilities;▪ Number and capacity of Materials Recovery Facilities processing biodegradable municipal, packaging and C&D wastes;▪ Number and capacity of thermal treatment, anaerobic digestion, or other waste treatment facilities processing biodegradable wastes; and▪ Number, type and capacity of landfill facilities.

13.7 In addition, the Department will develop indicators for the establishment of the biodegradable proportion and quantities of C&I, packaging, C&D, agricultural and other biodegradable waste streams recycled, recovered or landfilled. Waste characterisation studies will be initiated in 2004 to establish the current baseline % of biodegradable waste in the various waste streams and to monitor changes over time. The Department will liaise with DEFRA, and the Agencies in England, Scotland and Wales to ensure that indicators and surveys of biodegradable waste have regard to UK and EU reporting requirements and are consistent.

- 13.8 The Department will develop a consistent methodology for the measurement of KPI's in conjunction with the Monitoring and Reporting Taskforce, building on the Interim Guidelines published in March 2003. The aim is to ensure that reporting procedures are adopted by stakeholders across Northern Ireland, and that data collection and reporting conform to DoE and EU requirements.
- 13.9 The Monitoring and Reporting Taskforce will periodically review the Key Performance Indicators, to ensure that they remain appropriate, are based on reliable data, and remain consistent with EU reporting requirements.

Review of the Strategy

- 13.10 The Biodegradable Waste Strategy will inform, and will be informed by, future reviews of both the Waste Management Plans, and the Northern Ireland Waste Management Strategy.
- 13.11 The first review of the Biodegradable Waste Strategy will be undertaken by the Department by the end of 2005. The purpose of this is to assess and take into account, where appropriate:
- The review and update of the Northern Ireland Waste Management Strategy;
 - The review of the Waste Management Plans;
 - Feedback from the initial stages of implementation of the Biodegradable Waste Strategy; and
 - Changes in legislation and guidance, including that of agricultural wastes within the controlled waste framework.
- 13.12 In carrying out this Review, the Department will consult with stakeholders in order to identify issues, actions and priorities, and develop a consensus on the future management of biodegradable wastes.

I THE POLICY AND LEGISLATIVE CONTEXT

Introduction

- I.1 The United Kingdom has signed up to a wide range of international protocols and agreements, including those embracing Sustainable Development and EU Waste Management Policy. Such commitments are implemented by means of EU Directives, and associated legislation, and supported by policy measures and initiatives, at a national and regional level.
- I.2 The obligations imposed by these commitments have caused us to re-think how we should address the whole issue of waste management, whether indeed, we are wasting a potentially valuable resource. It is important therefore to understand the policy initiatives, and the legislative and fiscal measures that will influence our approach to the management of biodegradable wastes.

EU Waste Policy, Directives and Regulations

- I.3 EU Policy on Waste is set out in the Community Strategy for Waste Management, and enshrined in the Waste Framework Directive, and the supporting Hazardous Waste Directive. These directives are complemented by a number of waste stream specific directives, either adopted, or in preparation.
- I.4 The EU policy on waste management is based on five over-arching principles, as follows:
- The Waste Management Hierarchy
 - Self-sufficiency, at a Community, and if possible, Member State level.
 - Best Available Technique Not Entailing Excessive Cost (BATNEEC)
 - The Proximity Principle
 - Producer Responsibility

EU Sixth Environment Action Programme

- I.5 The EU has, in its Sixth Environment Action Programme entitled '*Environment 2010: Our future, our choice*' defined the priorities and objectives of the EU's environmental policy up to 2010, and described the measures to be taken to implement the EU's sustainable development strategy. With respect to the management of wastes, the Sixth Environment Action Programme builds upon the principles set out in the Strategy for Waste Management, setting the objective of decoupling resource use from economic growth through improved resource efficiency, and reducing the quantities of waste produced. It also sets an overall target to reduce the quantity of waste being disposed of by 20% by 2010, and 50% by 2050.

The Waste Framework Directive

- I.6 The Waste Framework Directive (75/442/EEC), as amended, sets out basic requirements for the establishment of a system for the co-ordinated management of wastes across the European Community. Specific objectives or requirements in the Directive include:
- The promotion of waste prevention, recycling, recovery, and energy recovery above disposal, known as the Waste Management Hierarchy.
 - The cost of waste disposal to be borne by the producers of wastes, in accordance with the 'Polluter Pays' principle.
 - Self sufficiency in waste disposal for the EU as a whole, and for each member state to move towards that aim individually.
 - Authorisation (licensing/registration) of the transportation, collection, treatment, storage or disposal of wastes.
- I.7 To achieve the stated objectives, the Directive requires Waste Management Plans to be drawn up, establishing an integrated and adequate network of disposal installations, and the introduction of a regulatory system to control the management of wastes, and protect the environment.

The Landfill Directive

- I.8 The Landfill Directive (99/31/EC) aims to prevent or reduce, as far as possible, the negative impacts of landfill on the environment, and in particular, on surface water, groundwater, soil, air and human health. It seeks to achieve this by introducing stringent technical requirements for the development, operation and closure of landfills, and for the nature of wastes that can be accepted at landfills.
- I.9 The Directive defines separate categories of waste, hazardous, non-hazardous and inert wastes, and divides landfills into three classes for the acceptance of wastes on that basis. It also sets out a waste acceptance procedure so that:
- Waste must be treated before being landfilled;
 - Non-hazardous Waste Landfills must be used for municipal wastes, and other non-hazardous wastes; and
 - The co-disposal of hazardous and non-hazardous wastes is banned.
- I.10 A key objective of the Directive is to reduce the quantities of biodegradable waste being disposed of to landfill. To achieve this, Article 5 of the Directive requires that Member States draw up a Biodegradable Waste Strategy. It also sets specific targets for reductions in the quantities of Biodegradable Municipal Waste (BMW) going to landfill. Taking into account the derogation allowed for those countries heavily reliant on landfill, the targets for the UK are to reduce the quantity of BMW disposed of to landfill to:

- 75% of 1995 levels by 2010;
- 50% of 1995 levels by 2013; and
- 35% of 1995 levels by 2020.

The Packaging and Packaging Waste Directive

I.11 The Packaging and Packaging Waste Directive (94/62/EC) aims to provide a framework for the management of packaging wastes, which affords a high level of environmental protection. It is founded on the principle of Producer Responsibility, and it applies to all packaging, regardless of material, and all packaging waste, regardless of origin.

I.12 The aims of the Directive are to:

- Prevent the production of packaging waste;
- Encourage the re-use of used packaging; and
- Introduce systems for the return and/or the collection of packaging waste, in order to achieve specified recycling and recovery targets.

I.13 The Directive has been subject to review and new, more ambitious targets, to be met by 2008, are anticipated, as follows:

- Recovery: 60% overall; and
- Recycling: 55% to 80% overall, with material specific targets, as follows:
 - Glass: 60%
 - Paper and Cardboard: 60%
 - Metals: 50%
 - Plastics: 22.5%
 - Wood: 15%

Forthcoming Directives: - Bio-waste

I.14 The EU continues to develop proposals for the management of specific waste streams, where considered appropriate, in support of the objectives of the Community's Waste Management Strategy, and the Waste Framework Directive. This includes the preparation of a Working Document, currently at 2nd Draft stage, on the Biological Treatment of Bio-waste. It is anticipated that a Directive, based on these proposals, is likely to be introduced in due course.

I.15 The objectives of the proposals are to promote the biological treatment of bio-waste, to protect the soil and ensure that treated bio-waste is used for agricultural benefit. The measures, encouraged as a means of achieving these objectives provided there are viable outlets, be it for the recycle, compost or digestate produced, include:

- Home composting.
- On-site composting and anaerobic digestion.
- Community composting.
- The separate collection of biodegradable materials.

- The use of treated, and certain specified untreated, bio-waste on land.

The Water Framework Directive

- I.16 The Water Framework Directive (2000/60/EC), although it is not specifically related to the management of wastes, is likely to have a significant influence on some applications, such as landspreading, in which biodegradable wastes are used.
- I.17 Essentially, this Directive establishes a framework for the protection of surface waters, coastal waters and groundwater, in order to prevent and reduce pollution, protect the aquatic environment, and improve aquatic ecosystems. To achieve this, it requires the preparation of River Basin Management Plans, which are likely to influence land management and agricultural practices in the future.

The Regulation on Animal By-Products

- I.18 The Regulation on Animal By-Products (1774/2002/EC) was adopted in 2002, and will apply in the United Kingdom from 30th April 2003. Its purpose is to ensure a high level of health protection, and to achieve this, the Regulation lays down strict rules for the collection, transport, storage, handling, processing and use or disposal of all animal by-products. In summary, animal by-products are to be treated by one of the permitted methods such as rendering, incineration or treatment in a composting, biogas or technical plant. Disposal to sewer, land spreading and landfill are no longer permitted as a disposal route for untreated products.
- I.19 The Regulation defines an animal by-product (ABP) as any part of an animal carcass, or any material of animal origin, not intended for human consumption. The scope of the Regulations includes not only ABP's as such, but also catering waste, that is waste from premises on which food is produced for direct consumption. This includes restaurants, catering facilities and kitchens, including household kitchens.
- I.20 The Regulation divides ABP's into three categories:
- **Categories 1 & 2** - the highest risk categories. Category 1 includes material such as specified risk material and the carcasses of animals infected or suspected of being infected with BSE. Category 2 includes diseased animals, condemned material and animals which are not slaughtered for human consumption. The permitted disposal routes are incineration and rendering, or, for Category 2 material, treatment in a biogas or composting plant, following appropriate treatment.
 - **Category 3** - essentially material which is not for human consumption. The permitted disposal routes include incineration; rendering; use in a petfood or technical plant; or, treatment in a biogas or composting plant. Category 3 includes catering wastes.

- I.21 The EU Regulation permits the treatment of Category 3 material in composting and biogas plants, and sets technical standards for its processing. The compost or digestate produced can be used as fertiliser on non-pasture land (i.e. land which is not grazed by animals). However, for facilities which compost catering waste (ie not animal by-products) the Regulation allows member states to specify their own standards and national level, provided that those standards guarantee an equivalent level of pathogen removal.

The Northern Ireland Legislative Framework

The Waste and Contaminated Land (NI) Order

- I.22 The Waste and Contaminated Land (Northern Ireland) Order 1997 is enabling framework legislation by providing the basis for implementing the requirements of the Waste Framework Directive, directly or through daughter Regulations. The Order covers three sorts of 'controlled' waste: household, commercial and industrial waste; and provides the legislative basis for the preparation of:
- A Waste Management Strategy for Northern Ireland by the Department of Environment; and
 - Waste Management Plans by District Councils.

- I.23 Measures enacted to date under subsequent Regulations include, inter alia:
- The Producer Responsibility Obligation (Packaging Waste) Regulations (NI) 1999:** Implementing the EU Directive on Packaging and Packaging Waste, including targets for the recycling and recovery of packaging waste.
- The Controlled Waste Regulations (NI) 2002:** Defining the types of waste to be treated as household, industrial and commercial waste, and prescribing a number of cases where a charge may be made for the collection of household waste.

The Landfill Tax (Finance) Act 1996

- I.24 This UK-wide Act came into effect in 1996, and is a specifically targeted levy on the disposal of waste to landfill. It was introduced as a fiscal measure by Government to effect change in the economics of waste disposal and encourage more sustainable waste management practices. There are two rates of taxation:
- A lower rate of £2/tonne for specified 'inactive' wastes; and
 - The standard rate of landfill tax for 'active' wastes, which include biodegradable wastes.
- I.25 The standard rate of landfill tax for active waste was first introduced at £7/tonne and is currently £13/tonne, on an escalator of £1/tonne per year. This escalator is scheduled to rise to £3/tonne, increasing the standard rate landfill tax to £35/tonne by about 2010.

Forthcoming Legislation - The Waste Emissions and Trading Bill

- I.26 This Bill extends to the whole of the United Kingdom, and is intended to give legal effect to Articles 5(1) and 5(2) of the Landfill Directive, and to introduce tradable allowances for local authorities to restrict the amount of biodegradable waste sent to landfill, although this latter aspect remains to be finalised in Northern Ireland, following the recent consultation on *Limiting Landfill*.
- I.27 The Bill requires each territory of the UK, namely England, Scotland, Wales and Northern Ireland, to have a national strategy for the reduction of biodegradable wastes sent for disposal to landfill.
- I.28 The Bill also makes provision for setting the maximum amount of biodegradable municipal waste which is allowed to be sent to landfill in each territory in the UK, based on the Landfill Directive Targets. It requires the Secretary of State to agree these maximum amounts with the appropriate authority in each territory, but where agreement is not reached, a default rule will apply. This default rule represents the rate of progress needed to meet the Landfill Directive targets in equal annual steps, commencing from a specified target in 2004.
- I.29 The annual targets, which apply to district councils in Northern Ireland, are statutory targets, with penalties for non-compliance. They commence in the first scheme year that runs from 17th July 2004 to 16th July 2005.

The Policy Framework

Sustainable Development

- I.30 Sustainable Development provides an over-arching context against which the development of waste policy at a European, national and local level takes place. The approach to moving from our current unsustainable pattern of growth, development and use of resources, towards sustainability, is set out in the UK and Northern Ireland Sustainable Development Strategies which are based on four main principles:
- Protection of the environment;
 - Prudent use of natural resources;
 - Social progress; and
 - Economic growth and employment.
- I.31 The prevention and management of wastes is at the heart of the framework for sustainable development, because of its impact on our environment, and on our use of natural resources.

The Northern Ireland Waste Management Strategy

- I.32 The Waste Management Strategy for Northern Ireland, which was published in 2000, offers a long term vision for the future development of waste management practices in Northern Ireland, and seeks to provide a supportive framework to enable this vision to be delivered. It firmly articulates EU Waste Policy, as set out in the Community Strategy on Waste, and the Waste Framework Directive, as appropriate to the regional context of Northern Ireland.
- I.33 The Strategy, which is a statutory document under Article 19 of the Waste and Contaminated Land (Northern Ireland) Order 1997, has a number of key objectives:
- To reduce the quantities of waste generated and maximise re-use, recycling and recovery of those materials which enter the waste stream.
 - To ensure that waste is managed with minimum impact on the environment and public health.
 - To put in place a framework for the preparation of joint Waste Management Plans, and develop an integrated network of regional waste management facilities which are cost effective to the public.
 - To attract investment, support economic development and create opportunities for increased employment and wealth creation.
 - To demonstrate leadership by adopting and promoting more sustainable practices of resource consumption and waste management.
 - To put in place a regulatory framework which supports those businesses who actively work towards more efficient and sustainable use of resources.
 - To provide the public with increased opportunity to contribute to environmental protection at the individual and household level.
- I.34 Six sets of policy measures go to make up the Strategy, as follows:
- Reduction, Recycling and Recovery – designed to drive forward progress towards sustainable waste management.
 - Strategy Leadership –recognising the need for Government to lead by example and to mobilise other stakeholders.
 - Planning and Infrastructure – promoting regional co-operation in the delivery of the network of facilities needed to meet our needs.
 - Regulations and Guidance –encouraging and support good practice.
 - Improving Our Understanding – designed to improve the level and accuracy of waste management data and information.
 - Marketing the Strategy – aimed at raising the profile of waste management, and encouraging the more efficient use of resources, through education, guidance and training.

I.35 The Northern Ireland Waste Management Strategy defines roles and responsibilities, and provides the supporting policy platform for the development and implementation of the Waste Management Plans.

Waste Management Planning

I.36 District Councils have a statutory duty to prepare Waste Management Plans, under Article 23 of the Waste and Contaminated Land (NI) Order 1997, to determine what arrangements are needed for the recovery, treatment and disposal of controlled wastes in their districts.

I.37 The District Councils have formed three sub-regional waste planning groups, which allow the Councils to share resources and achieve economies of scale, in the provision of services and facilities, for mutual benefit.

I.38 These Waste Management Plans recognise that waste planning is a dynamic process, and that they will continue to evolve and develop over time, hence the Plans place significant emphasis on ongoing monitoring implementation and progress, and will be subject to periodic review. The Waste Management Plans were adopted by the respective Councils by January 2003.

II OVERVIEW OF WASTE TREATMENT TECHNOLOGIES

Introduction

- II.1 This section presents a brief overview of the main options that are available for the management of biodegradable wastes, after it is collected. In principle, biodegradable waste can either be: 'recycled' in order to reuse cellulose fibre; or, 'recovered' to recover the nutrients and energy contained in the waste. The principle methods therefore include:
- **Waste Prevention and Minimisation**
 - **Recycling**
 - **Biological Treatment**
 - Composting; and
 - Anaerobic Digestion
 - **Thermal Treatment**
 - Incineration;
 - Pyrolysis; and
 - Gasification
- II.2 A number of factors, including economic, social, infrastructural, and environmental issues, are likely to influence which methods are considered appropriate for any specific area. The market for both the feedstock, such as paper and cardboard, and organic wastes, and the market for the products, such as compost, and heat and energy, are quality and reliability-related issues, central to any decision-making process.
- II.3 All of these approaches are suitable for diverting biodegradable wastes from landfill. Their principal advantage is that they can reduce the demand for raw materials, and/or produce energy, and avoid the negative impacts associated with landfilling of biodegradable materials, such as the production of greenhouse gases, and high strength organic leachates. In addition, where the separate collection of materials is undertaken, it encourages participation and raises awareness.
- II.4 There are however two key strategic issues, namely: that adequate and reliable markets are available for the products produced, and that they are of the quality required to meet the needs of the market. Inevitably, this means an emphasis on the separate collection or separation of materials, and investment of resources in education and awareness.

Waste Prevention and Minimisation

- II.5 Waste prevention and minimisation aims to reduce the quantities of waste produced, and is the most desirable option, at the top of the Waste Management Hierarchy. The potential advantages associated with it include savings in resources, raw materials and disposal costs, as well as a reduction in the potential environmental impacts, such as the emissions associated with other waste management options. Prevention and minimisation however is potentially difficult to implement and deliver, as part of an integrated approach to waste management.
- II.6 To minimise the production of household wastes, changes are required in consumer attitudes and behaviour, which need to follow through into the exercise of individual purchasing decisions. Examples include the avoidance of heavily packaged goods, the use of refillable containers, and the purchase of long-life products.
- II.7 The prevention and minimisation of commercial and industrial wastes requires processes, and supply chains, to be assessed and re-engineered by manufacturers and suppliers, in order to prevent the production of waste in the first place. Such approaches, when undertaken from first principles, may also produce additional benefits, such as reducing the amounts of raw materials required, or reducing energy consumption, so that although this process can involve both time and costs, there is significant potential for savings to be made, in order to pay back the investment over reasonably short timescales.

Recycling

- II.8 Recycling is the collection and sorting of materials for reprocessing into a useable product. The quality of the materials collected is the key issue, with the emphasis on separation of materials, to ensure low levels of contamination, so that the feedstock is of a reliable quality. In principle, recycling can conserve natural resources, both in terms of raw materials, and lower energy consumption, and it saves on disposal costs, by diverting wastes from landfill.
- II.9 Recycling can create employment opportunities, in the collection and processing of materials, and the manufacturing of products, but the development of long term reliable markets is the key issue, which needs to be developed.

- II.10 There are a number of systems available for the separation and collection of recyclable materials, each of which has an important role to play in an integrated approach to maximise the recycling of waste materials, including appropriate biodegradable wastes. These systems can be considered broadly under three headings:
- Kerbside Collection;
 - Bring Banks; and
 - Civic Amenity Sites

Kerbside Collection

- II.11 Kerbside collection involves separating wastes into different containers for collection from the point of origin. Examples of containers used in Northern Ireland for the collection of dry recyclable materials from the household waste stream include:
- Blue/green bins: Coloured bins or boxes, for the separate collection of mixed dry recyclable, including paper.
 - Brown bins: For the separate collection of compostable materials.

- II.12 Experience has shown that comprehensive kerbside collection schemes can recover significant proportions of the waste stream, including 50% of paper and organic waste, and are the most effective means of achieving high levels of public participation.

Bring Banks

- II.13 Bring banks comprise colour-coded containers, with each designated for a specific waste material, strategically located in positions accessible to the public, for example, in supermarket car parks or at petrol stations. Paper, cardboard, glass, aluminium cans and textiles can be collected in this manner. This method is particularly suitable for areas with high residential densities with limited space available for larger containers.
- II.14 The accessibility and distribution (number and location) of Bring Banks are recognised as being the most significant factors in their use and hence their ability to contribute to the diversion of wastes from landfill. Well designed bring bank schemes can recover up to 10% of the household waste stream.

Civic Amenity Site

- II.15 Civic Amenity (CA) Sites are facilities where the public, and in some cases commercial traders, can directly deposit waste. Whilst accepting a range of wastes for disposal, such as bulky household wastes, these facilities typically incorporate a wide range of recycling activities, including paper and cardboard, and green wastes, which are usually collected in large skips. Well located sites, serving local population catchments, can therefore divert significant quantities of biodegradable wastes from landfill by the collection of materials for recycling and composting.

Overview of Treatment Methods

- II.16 Biological wastes, as noted above, may be recovered by either biological or thermal treatment processes. Biological treatment includes composting and anaerobic digestion. Thermal treatment includes incineration, gasification and pyrolysis.
- II.17 Many factors will influence which methods are selected for the treatment of biodegradable waste, including for example: the markets for products, such as compost or gas; transportation distances; costs; the availability of distribution networks for heat and power; the track record of the technology; and the quality of the feedstock related to source-separated collection. Table II.1 provides an overview of these treatment methods.

Table II.1 Overview of Technologies for the Treatment of BMW

Overview of technologies for biodegradable waste	Biological method		Thermal method		
	Compost	Anaerobic digestion	Incineration	Pyrolysis	Gasification
Proven technology, track record	Yes; Very common	Yes; common	Yes; very common	Partly; few	Partly; few
Basic principle	Degradation by aerobic microorganisms	Degradation by anaerobic microorganisms	Combustion	Anaerobic Thermochemical Conversion	Thermo-chemical Conversion
Cost of treatment	Low to high	Medium to high	Medium to high	Medium to high	High to very high
Suitability	Good	Good	Good	Medium	Depending on Technology
Waste acceptance	Source separated waste only since matter and nutrients are to be recovered as pure as possible	Source separated wet waste only since matter and nutrients are to be recovered as pure as possible	All waste since air cleaning technology is good and residual solids are minimised by volume reduction	In particular suitable for contaminated, well defined dry waste fractions	Source separated dry waste only unless combined with better cleaning technology
Energy recovery	No	Yes	Yes	Yes	Yes
Nutrient recovery	Yes	Yes	No	No	No
Products for recycling or recovery	Compost	Fibres, Fluids	Bottom ash (incl. Clinker grit, glass); Metal	Char (incl. bottom ash, clinker, grit, glass) Metal	Vitrified bottom ash (incl. clinker, grit, glass); Metal
Residuals for other waste treatment or for land filling	Overflow sieving (plastic, metal, glass, stones)	Overflow sieving (plastic, metal, glass, stones)	Fly ash (incl. flue gas residues)	Flue gas residues	Gas cleaning residues

Source: *Biodegradable Municipal Waste Management in Europe, Part 3: Technology and Market Issues*. European Environment Agency, January 2002.

Composting

- II.18 Composting converts biodegradable waste into compost, a stabilised material, rich in humic substances and nutrients, which can be used for a number of purposes, including as a fertilizer, a growing medium or soil improver. As a process, it essentially represents 'recycling' of biodegradable wastes, but critical to its success is the production of a material that meets recognised standards for proposed applications, as summarised for example, in Tables II.2 and II.3.
- II.19 Composting is a biological process which involves the breakdown of the waste by micro-organisms under aerobic conditions, ie in the presence of air. It involves a series of steps, as follows:
- Shredding/chipping: Mainly of garden wastes, to reduce the size of particles.
 - Composting: In open windrows or enclosed vessels for several weeks.
 - Maturation: To stabilise the compost over a period of months.
 - Screening/sieving: To remove contaminants prior to use.
- II.20 There is a wide range of composting technologies available, which range from small domestic units, to large highly technological centralised plants. In principle, these can be considered under three broad categories:
- Home Composting
 - Windrow Composting
 - In-vessel Composting
- II.21 Irrespective of which method is adopted, successful composting relies on efficient materials segregation, with the removal of any contaminants such as glass, metals and plastics which may adversely affect the efficiency of the composting process, and the potential use and marketability of the end-product.

Home Composting

- II.22 Home composting can be undertaken by individual householders in their own gardens, by placing garden and kitchen waste in compost heaps or dedicated containers. It has the benefit of avoiding the need to collect and treat the waste, and is supported as a waste reduction measure by district councils across Northern Ireland in their Waste Management Plans. Home composting of wastes that contain any material of animal origin, such as food scraps, however has to be treated with caution, because of the possibility of only limited control of the process, and low operating temperatures, which can create health risks (see also Annex IV). Home composting therefore may not be appropriate for certain types of kitchen wastes. Further guidance on this however will be issued in due course by the Department.

Windrow Composting

II.23 This is one of the most common forms of composting, which is most appropriate for green/garden wastes, where the organic material is placed in long rows, known as 'windrows'. The control of the composting process is based on the homogenisation and mixing of the waste, followed by aeration and often irrigation. Windrow composting facilities therefore generally fall into one of two categories: composting without forced aeration, a low technology approach; and, composting with forced aeration and temperature feedback, a technologically more advanced approach. Generally in Northern Ireland, such systems can only be successfully undertaken all year round under cover, due to the relatively high rainfall, and the potential to create leachate.

In-vessel Composting

II.24 In-vessel composting allows biodegradable wastes to be broken down under enclosed and controlled conditions in specially designed containers, tunnels or bays. Although typically the most expensive method of composting, it is particularly suitable for kitchen and food wastes, which have been collected separately, as it minimises the potential health and environmental risks associated with these materials (see also Annex IV).

Table II.2 Compost Quality Requirements¹

PARAMETER²	LIMITS³
<u>Human Pathogens</u>	
Salmonella spp	Nil
Escherichia coli	< 1000 CFU g ⁻¹
<u>Potentially Toxic Elements</u>	
Cadmium	≤ 1.5 mg kg ⁻¹
Chromium	≤ 100 mg kg ⁻¹
Copper	≤ 200 mg kg ⁻¹
Lead	≤ 200 mg kg ⁻¹
Mercury	≤ 1 mg kg ⁻¹
Nickel	≤ 50 mg kg ⁻¹
Zinc	≤ 400 mg kg ⁻¹
<u>Physical Containments</u>	
Total, glass, metal and plastic > 2mm	≤ 0.5%
Stones and other consolidated mineral contaminants >2mm	≤ 7%
<u>Phytotoxins</u>	
Plant germinator and growth (relative to control samples)	> 80%
<u>Weed Propagules</u>	
Viable weed propagules	< 5 l ⁻¹

Notes: 1. Source: PAS100. Specification for Composted Materials, BSI October 2002.
 2. For further information and test methods refer to Section 9 of PAS100.
 3. CFU refers to Colony Forming Units

Table II.3 Compost Parameters according to End-Use

Parameter	Test Method	End-use for Compost									
		Growing Media ¹	Turf Dressing ¹	Tree Planting	Manufactured Top Soil ^{1,2}	Soil Improver	Fertilizer	Mulch	Biofilter	Biofuel	
Pathogens (human)	See 9.1	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		
Pathogens (plant) ³	No standardized test methods yet										
Potentially toxic elements	See 9.2	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		
Physical contaminants	See 9.3	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		
Phytotoxins (plant germination and growth bio-assay)	See 9.4	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		
Weed propagules	See 9.5	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		
Organic matter content as % mass/mass dry matter	BS EN 13039	✓	✓	✓	✓	✓	✓	✓	✓		✓
Total nitrogen (N) as % mass/mass dry or mg/l as received	BS EN 13654-1 and/or BS EN 13654-2	✓	✓	✓	✓	✓	✓	✓	✓		
Total potassium (K) as % mass/mass dry matter of mg/l as received	BS EN 13650	✓	✓	✓	✓	✓	✓	✓	✓		
Total phosphorus (P) as mass/mass dry matter or mg/l as received	BS EN 13650	✓	✓	✓	✓	✓	✓	✓	✓		

Table II.3 Compost Parameters according to End-Use (Continued)

Parameter	Test Method	End-use for Compost									
		Growing Media ¹	Turf Dressing ¹	Tree Planting	Manufactured Top Soil ^{1,2}	Soil Improver	Fertilizer	Mulch	Biofilter	Biofuel	
Total chloride (Cl) as mg/l as received	BS EN 13652	✓	✓								
Nutrients (calcium chloride extractable)	BS EN 13651	✓	✓	✓		✓			✓		
(water soluble: chloride, ammonium, nitrate)	BS EN 13652	✓	✓	✓		✓			✓		
Electrical conductivity as mS/m	BS EN 13038	✓	✓	✓	✓	✓					
pH ⁴	BS EN 13037	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Bulk density	BS EN 13040	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Moisture or dry matter content	BS EN 13040	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	
Particle size distribution e.g. as x % less than y mm in diameter	Annex E	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Air-filled-porosity	BS EN 13041	✓									
Water-holding-capacity	BS EN 13041	✓									

Notes: ✓✓ Test/determination is obligatory
 ✓ Test/determination and declaration in labeling is recommended
 1. Compost will, or is likely to, be an ingredient rather than the sole constituent and therefore information about certain properties of the compost will be important to those carrying out blending or product formulation.
 2. The concentrations of major, secondary and trace elements are defined in the UK Fertiliser Regulation (1991) [18]
 3. Reference to sanitization performance should be made
 4. It is useful to supply a note relating to suitability for use with acid loving plants.

Anaerobic Digestion

- II.25 Anaerobic digestion is a biological treatment method, which uses micro-organisms to digest organic wastes, in the absence of oxygen. Overall, the process, which is carried out in an enclosed 'reactor' recovers a high level of value from the wastes, in the form of both nutrients and energy, with the production of:
- Digestate: A stabilised compost type residue;
 - Liquid: A liquid fraction high in nutrient content; and
 - Biogas: A gas with a high methane content.
- II.26 Anaerobic digestion is carried out in a 'reactor', which usually consists of a large vessel in which the waste is fed, and continuously mixed, to ensure even distribution of the temperature. As a process, therefore, it allows a high degree of control, and is suitable for a range of biodegradable wastes, including catering and food processing wastes, sewage, and agricultural slurries and manures. It is not however suitable for treating some biodegradable wastes, such as newspaper, textile and wooden park waste. In fact, the use of anaerobic digestion for municipal wastes is not yet widespread, but experience has shown that where it is used, source-separated collection is essential, to ensure the quality of the digestate.
- II.27 There are in principle three main methods available: separate digestion (dry method); separate digestion (wet method); and, co-digestion (wet method), with the choice influenced by the waste stream being treated. The treatment of Biodegradable Municipal Waste, for example, generally consists of separate digestion in a 'dry' process, whereas slurries and manures are treated by 'wet' processes. The relative quantities of biogas, digestate and liquid are influenced by the wastes, and the treatment method. There are clearly potential synergies, however, over a range of biodegradable wastes, including agri-food wastes, certain agricultural wastes, and fractions of other waste streams.
- II.28 The digestate can be used as a soil conditioner, or fertilizer, and ploughed directly down into the fields. It may however require additional composting if used for horticultural or gardening applications. The biogas can be used for heating, or combined heat and power production, and the liquid produced can be used as a liquid fertilizer, in both cases, provided there are suitable markets.

Incineration

- II.29 Incineration is a relatively well-established thermal treatment technology, used widely for the treatment of municipal wastes across the EU. As a technology, it can accommodate unsorted municipal waste, as well as some industrial wastes. It can therefore accommodate a heterogeneous feedstock, so that contamination of the waste stream processed by this method, therefore, is generally not an issue.
- II.30 The process of combustion, under controlled conditions at high temperatures, reduces the amount of waste to a fraction of its original volume and weight. Thermal energy is also produced by the process, allowing energy to be recovered in the form of heat (hot water/steam), or power, or both. High efficiencies in energy recovery, to 85 %, can be achieved, where both heat and power are recovered. No nutrient or organic matter however is recovered.
- II.31 The principal incineration technologies available include: moving grate; and fluidised bed furnaces. Moving Grate furnaces, otherwise known as 'Mass Burn', move the waste through the combustion zone by mechanical means, typically a series of rotating drums or rollers, moving bars or rockers. Fluidised Bed furnaces combust the waste on a bed of inert material such as sand, with the bed 'fluidised' by bubbling air through it to the waste.
- II.32 The fundamental principles underpinning both technologies are similar, and both produce residual products, in the form of bottom ash, and fly ash, the latter from flue gas cleaning operations. The bottom ash, or clinker, can be used as a gravel material in construction applications, such as road building, but the fly ash must be disposed of to landfill.
- II.33 The investment needed to develop incineration facilities is high, which generally means that the operation of any such facility needs to be underpinned by a long term contract, that guarantees a continuous supply of waste. There have been concerns therefore that the incorporation of incineration as part of a waste management strategy reduces the incentive for further waste reduction and recycling, once the plant is operational. Evidence from elsewhere in Europe however shows, provided that it is part of an integrated solution, incineration can be combined with recycling and composting, without negative effects, and that it does have a key role where the objective is to reduce the quantity of waste disposed of to landfill.

Pyrolysis and Gasification

II.34 Gasification and pyrolysis are emerging technologies, most suitable for 'dry' biodegradable wastes, which at present have only a limited track record of full-scale operation. They represent refined thermal treatment methods as alternatives to incineration, designed to minimise emissions and maximize thermal efficiencies, and the recovery of recyclable materials, including metals. The surplus heat generated by these processes can be recovered as heat (hot water/steam), as electric power, or both. As with incineration however, there is no recovery of nutrients or organic matter.

Pyrolysis

II.35 Pyrolysis is a thermal pre-treatment method, which takes place in the absence of oxygen, to produce heat and energy, a solid char material, a hydrocarbon-based liquid, and flue gas residues. Pyrolysis can be a stand-alone treatment, but it is generally followed by a further combustion process, such as incineration or gasification, to ensure maximum energy recovery from the waste feedstock.

Gasification

II.36 Gasification is a thermal treatment method, which involves partial combustion with air, or pure oxygen, to produce heat and energy, a combustible gas, a vitrified bottom ash, and gas cleaning residues. The gasification process is normally followed by the combustion of the combustible product gases in a furnace, turbine, or other internal combustion engine, as an integral part of the overall process, to maximize energy recovery, with efficiencies of up to 85% reportedly achievable.

II.37 The volumes of flue gases produced by both of these processes are significantly reduced in comparison to incineration. Also, due to the processing of the wastes in low oxygen conditions, there is less potential for the production of NO_x gases, and dioxins.

II.38 Although these technologies are relatively high cost, they are not subject to the same economies of scale as incineration, and plants may be viable with relatively low inputs, of the order of 25,000 tonnes per annum. It is anticipated therefore that the treatment of wastes by pyrolysis and gasification will have wider applications in the future, as they become proven and established technologies, due to environmental considerations and the flexibility of the systems.

III REVIEW OF EUROPEAN PRACTICES

Introduction

III.1 Northern Ireland relies heavily on landfill for the disposal of Biodegradable Municipal Wastes, a practice at variance with the primary objective of this Strategy, which is to reduce the quantities of biodegradable waste disposed of to landfill. A review of practices in many other European countries, however, demonstrates that although practices vary widely, in many instances, reliance on landfill has already been significantly reduced.

III.2 This is illustrated in Table III.1, which summarises the management options adopted for the BMW in other EU countries, in relative percentage terms. It is evident from this that there are lessons to be learnt from experiences elsewhere, not only in terms of the technologies used, but also the approaches and instruments used.

Table III.1 Management of BMW in Countries and Regions within the EU¹

COUNTRIES	BMW MANAGEMENT ROUTES (% OF TOTAL BMW PRODUCED)					
	Landfill	Incineration	Composting	Recycling	A.D. ²	Other
Northern Ireland (2001)	90.6	0	5.0	4.4	0	0
United Kingdom (1998/99)	86.2	5.7	3.0	5.1	0	0
Ireland (1998)	90.3	0	0.5	9.3	0	0
Germany (Baden-Wurttemberg) (1998)	30.2	12.3	17.9	37.1	0	2.6
Austria (1996)	20.4	13.3	22.9	29.7	0	13.7
Belgium (Flanders) (1998)	16.7	22.1	34.3	22.8	0	4.1
Norway (1997)	59.0	17.0	5.0	20.0	0	0
Finland (1997)	64.9	5.8	5.2	22.0	1.4	0.6
Netherlands (1998)	13.1	36.5	33.3	19.0	0	0
Denmark (1998)	5.3	54.3	29.6	10.4	0.4	0
Italy (1997)	68.4	5.7	11.4	8.1	0	6.4
Spain (Catalonia) (1998)	73.4	20.7	1.3	4.6	0	0
France (1998)	40.3	35.7	8.9	3.5	0.3	11.2

Notes: 1. Source: EEA, 2002. *Biodegradable Municipal Waste Management in Europe. Part 1: Strategies and Instruments. Table 5.*

2. A.D. refers to Anaerobic Digestion.

III.3 This Annex therefore reviews a number of case studies^{IV.1,IV.2} drawn from several regions and countries within the EU, with a view to identifying those factors, be they the selection of a particular technology, or mix of technologies, or the adoption of economic or regulatory instruments that have been critical to the high diversion rates from landfill. These countries and regions, and the particular examples, were selected partly because of the high rates of waste diversion from landfill achieved, but also because Flanders, Denmark and the Netherlands are more similar in size and population to Northern Ireland than most other European Countries; Flanders is a semi-autonomous region as is Northern Ireland; and Austria and Germany are often referred to as 'role-models' in waste management.

Austria

Policy Objective

III.4 Austria introduced an initiative in the mid 1990's to minimise the quantities of BMW landfilled. This was based on a twin strand approach, namely recycling, for separately collected paper and cardboard and composting of separately collected food and garden wastes, implemented by means of supporting statutory instruments.

Policy Instruments

III.5 The primary policy instruments, which are complemented by the national policy on incineration with energy recovery, included:

- *An Ordinance on the Separate Collection of Bio-waste*, which, dating from 1995, imposes a legal obligation on municipalities to separately collect and treat organic wastes from households.
- *A Landfill Ordinance*, which amongst other measures, sets limits for the overall value of pollutants with respect to waste to be landfilled, which includes a maximum content of organic carbon of 5%.
- *A Landfill Tax*, the rate of which is related to the type and quality of the waste, as well as the standard of the landfill.

Effectiveness of the Initiative and Summary Lessons

III.6 The effect of these targeted efforts has been to reduce the quantities of BMW landfilled to 20%, which already meets the long term (2016/2020) Landfill Directive targets. These results have been achieved due to the introduction of the source-separated collection schemes, supported by a mandatory regulatory framework and well-designed economic instruments, and the availability of a range of technologies to treat the wastes, including recycling, composting, incineration, and mechanical-biological treatment.

Denmark

Policy Objective

- III.7 During the 1990's, a number of municipalities in Denmark sought to apply the 'polluter-pays-principle' to households, by introducing a weight-related collection scheme for household waste, with the objective of encouraging waste prevention, and improving recycling rates. This initiative is based on the weighing of the dustbins when they are emptied, with the fee payment system generating individual accounts for each household. This is in contrast to the 'pay-per-house fee' which is the normal system in Denmark, which is a fee based on the collection equipment used. The source separation of organic household waste was introduced simultaneously with the weighing system in a number of the municipalities.

Policy Instruments

- III.8 The municipalities are not required by law to collect biodegradable household waste separately, so the incentives are provided by:
- *The 'Pay-per-kg Fee'*, which stimulates glass and paper recycling, and home composting.
 - *A Waste Tax on Landfilling and Incineration*, which is designed to make recycling more cost effective than incineration and landfilling.
 - *Variable Charging*, which some municipalities have introduced, with a lower fee for collecting source separated household waste, than for mixed household waste, in order to reward recycling.

Effectiveness of the Initiative and Summary Lessons

- III.9 The introduction of the payment system in Denmark, based on the quantity of waste produced, has had the effect of increasing the amount of waste collected through recycling schemes, and decreasing the quantity of mixed household waste produced. As a measure, it has not however changed consumer attitudes or behaviour at the point of purchase, so a corresponding reduction in the total quantities of household waste produced is not expected. The tax also appears to have increased the incidence of local fly-tipping, although this seems to be relatively limited, with no indications of large-scale illegal handling. As a system, it has also increased the administrative burden on municipalities.

The Netherlands

Policy Objective

- III.10 Waste policy in the Netherlands has focused on waste prevention and recycling, in order to minimise the quantities of waste disposed of to landfill and incineration. As a result of this, the Organic Household Waste Action Programme was launched in 1991, with the primary objective of recovering organic household waste for treatment by composting and anaerobic digestion.

Policy Instruments

- III.11 The instruments used to implement and support the Action Programme include:
- *The Environmental Management Act*, which came into force in 1993, directing local authorities to collect organic household waste separately.
 - *A Ban on the Landfilling of Organic Household Waste*, which has applied since 1996.
 - *Landfill and Incineration Taxes*.
 - *Standards for Compost Quality and Use*.
 - *Producer Responsibility Initiatives*, which includes for example, the handing over of paper, which is separately collected from households, free of charge.

Effectiveness of the Initiative and Summary Lessons

- III.12 The Netherlands is one of the most progressive countries, at the forefront of efforts to reduce reliance on landfill, and one of the highest performers with regard to the recycling and recovery of wastes, with 13% of BMW landfilled, 37% incinerated (with energy recovery) 33% composted, and 19% recycled. This has been achieved through a set of complementary legislative measures, which includes a ban on the landfilling of recyclable materials and organic waste, a landfill tax, and an obligation on local authorities to separately collect the recoverable waste fraction.
- III.13 These measures have resulted in a significant increase in the provision of processing capacity for organic wastes, which has had to be coupled to the development of markets for the recovered materials. The ban on the landfilling of organic wastes, together with the development of standards for the use of compost derived from biodegradable municipal waste, have been instrumental factors in the development of markets.
- III.14 The Organic Household Waste Action Programme has however faced some difficulties with the quality of the collected organic household waste, the working environment for the collecting personnel, and the cleaning of the containers. The costs for the double collection system are also higher than for the previous systems.

The Flanders Region - Belgium

Policy Objectives

- III.15 Flanders is one of three regions of Belgium, the other two being Wallonia and Brussels. Since environmental policy is a regional matter, all decisions concerning waste management are taken by the Flemish government. Recent initiatives have seen the introduction of an implementation plan for household waste, which is reviewed every four years. The current (draft) plan, for the period 2003 - 2007 promotes the aims of the waste hierarchy, by setting targets, and using result-based actions and instruments to achieve its objectives. Specific targets include:

- Separate collection of household waste to reach 71% in 2007;
- Prevention: 4% in 2007;
- The phased implementation of a ban on landfilling and incineration; and.
- A decrease in incineration capacity in order to keep the pressure on prevention and recycling.

Policy Instruments

- III.16 The main policy instruments applied by the Flemish Government include the following:
- *A Ban on the Landfill of Certain Biodegradable Waste Streams*, including separately collected paper and cardboard, food and garden wastes, and municipal waste from households.
 - *A Ban on the Incineration of Certain Separately Collected Waste Streams*.
 - *A Landfill and an Incineration Tax*.
 - *Municipal Environmental Covenants*, to promote separate collection schemes.
 - *Environmental Covenants*, with producers to introduce producer responsibility measures.
 - *The Regulation on Waste Prevention and Management*, that provides for how different waste fractions have to be collected and disposed.
 - *Home Composting Programmes*, to increase the levels of composting.

Effectiveness of the Initiative and Summary Lessons

- III.17 The initiatives by the Flemish government have seen a significant increase in the total quantities of municipal waste collected separately, from 18% in 1991, to 59% by 1999. This has seen a corresponding increase in the levels of recycling and recovery of municipal waste in 1999 to 27% and 25% respectively, with incineration and landfill accounting for 18% and 30%.
- III.18 The municipal environmental covenants have proven to be one of the most notable instruments, fundamental to the successful separate collection of certain waste fractions such as food waste, garden waste, wood, textiles, paper and paperboard, white and brown goods, drinking cartons and plastics. These agreements, which are made between a municipality and the Flemish Community, stimulate, amongst other things, the setting up of separate collection, treatment initiatives, the marketing of municipal waste products and public awareness campaigns in exchange for financial remuneration.

Germany

Policy Objectives

- III.19 Germany has been a pioneer of high waste management standards within the EU, and its policies and experiences have been a core driver of European policy and legislation. Key features of German waste policy are:

- Waste minimisation, by avoidance and recycling must be an essential element of waste management strategy.
- Waste to be treated and disposed of in an environmentally sound manner, using highly sophisticated technologies.

Policy Instruments

- III.20 Germany has applied different kinds of instruments, with the exception of a landfill tax, to achieve its waste policy goals. This includes: a comprehensive regulatory framework, with instruments embedded in laws, decrees and permits; the implementation of Producer Responsibility; and, the increasing application of Pay As You Throw (PAYT) schemes.
- III.21 Responsibility for environmental protection, including waste management, in the Federal Republic of Germany is shared among the Federal Government, the Federal States (*Länder*) and the local authorities. Notwithstanding this, specific instruments and measures, which broadly apply nationally include:
- *The Recycling Management and Waste Act*, dating from 1994, which provides framework legislation for waste management in Germany. The aim of the Act is to promote closed loop recycling, and to ensure the environmentally sound disposal of waste. The Act also places an increased emphasis on waste avoidance and it also contains comprehensive measures for the control of waste management and, throughout all phases of the waste management cycle, mandates requirements for waste provision, supply, collection, transport, recycling, recovery and disposal. Municipal authorities are obliged to collect separate fractions of municipal waste. One of the key features of the Act is that waste has to be treated prior to landfill.
 - *Separate Collection of Household Wastes*, with householders required to segregate their waste according to type, as follows: packaging, glass, biodegradable wastes, paper and other.
 - A '*Waste Police*', who are responsible for checking the content of the waste containers. If the containers contains too many other waste fractions, then they won't be emptied with the next collection round.
 - *PAYT Schemes*, which have been tested in various Federal States (*Länder*).
 - *Producer Responsibility*, which has been implemented for producers and traders of products, who are responsible for the environmentally friendly production and for the take-back of products after use. All bans, restrictions and take-back obligations are embedded in law, with the Packaging Ordinance setting high recovery targets for manufacturers and distributors of packaging waste to collect and recycle the packaging waste they are responsible for. Consumers must pay for packaging, distinguished by the '**Green Dot**', to finance the recycling of packaging.
 - *Waste Plans*, which provide a high level of control, with each Federal State government setting out in its 'waste plan' what waste fractions need to be treated by which methods.

Effectiveness of the Initiatives and Summary Lessons

- III.22 Germany is often seen to be leading Europe in waste management and recycling, with their approach having seen a significant diversion of wastes from landfill over the period since 1990, with corresponding increases in the volumes of waste composted and recycled. The policy measures used are centred around compulsory separate collection by municipalities, combined with compulsory separation of waste into five fractions by householders. Extensive use is also made of producer responsibility, particularly the well known 'green dot' scheme for packaging wastes.
- III.23 The net result has been the development of an integrated waste management system, comprising a balanced mix of recycling, composting, waste to energy and landfill. It is the only one of the examples considered which has not used landfill tax, relying instead on stricter legislation requiring separate collection both by municipalities and by packaging waste producers, and compulsory separation by householders, backed up by strict enforcement (the so called 'waste police').
- III.24 The German experience of PAYT schemes, however, have proved successful in increasing the amount of separated waste collected, but not a reduction in the total waste collected. It has also highlighted a number of associated issues, including: the administrative complexity; illegal dumping; the difficulty in having a PAYT scheme accepted by residents, hence the need to have an effective education programme; increased costs; and, changes in the logistics of collection and route planning.

Comparative Overviews and Lessons

- III.25 All of the case studies presented demonstrate that countries and regions have been able to make significant progress over the last 10 years in diverting waste from landfill, and increasing the rates of recycling and composting of municipal waste, through a range of measures and initiatives. In all cases, however, although the specifics of the approaches may have varied, the final integrated waste management solutions include all four of the major technologies, including recycling, composting, incineration and landfill. The different examples also illustrate that high levels of incineration do not exclude high levels of composting and recycling.
- III.26 These significant levels of diversion of waste from landfill, to recycling and composting, have generally been achieved through a combination of policy measures. Five major policy measures can be identified as having effected these changes, of which at least three are used in each country.
- **Bans** of the landfill (or incineration) of certain waste streams, generally separately collected recyclables or organic waste, or of wastes suitable for incineration.

- **Taxes** on landfill or incineration of waste (with wastes which are collected separately, or which go to composting or recycling, being zero rated). These taxes were generally introduced at relatively low levels, and have already been increased significantly (with current levels typically around 50 euros per tonne), and further significant increases are planned.
- **Compulsory separate collection by municipalities.** This is applied in four of the five examples, with the Flanders using municipal environmental covenants, in which municipalities undertake to provide selective collection in return for grant funding from the Flemish Government.
- **Compulsory separation by householders.** Germany is the only one of the case studies which does not apply landfill taxes, but is also the only one which requires householders to separate their waste (into 5 fractions, packaging, glass, biodegradable wastes, paper and other), backing this up through enforcement by the 'waste police'.
- **Producer responsibility**, which is used in all countries to differing degrees. The way in which producer responsibility systems are implemented can effect the degree of incentive provided: for example, in Germany, householders are required to separate packaging wastes, with the responsibility for separate collection and recycling falling on the producers.

III.27 These case studies have highlighted two key building blocks for the diversion of wastes from landfill, which include:

- An integrated waste management solution, designed to promote more sustainable practices including the diversion of wastes from landfill. This requires a mix of technologies, which includes recycling, composting and incineration, or other form of thermal treatment.
- A range of complementary policy measures are also needed to create the necessary framework to support the diversion of wastes from landfill.

IV ANIMAL BY-PRODUCTS

Introduction

- IV.1 The EU adopted the Regulation on Animal By-Products (1774/2002/EC) on 3 October 2002, which lays down strict animal and public health rules for the collection, transport, storage, handling, processing and use or disposal of all Animal By-Products (ABP's). This Regulation applies throughout the EU from 1 May 2003.
- IV.2 The Regulation is a major component in the EU's approach to combat and eradicate fee-borne food crises, such as BSE, foot and mouth disease and swine fever, by seeking to ensure that only material fit for human consumption enters the feed chain. The scope of the Regulation however applies not only to animal by-products, such as fallen animals, parts of animal carcasses, and processed by-products, but it also extends to 'catering wastes', which contain meat or products of animal origin. Catering wastes were specifically included within the scope of the Regulation to avoid the potential spread of animal diseases.
- IV.3 Catering waste is defined as waste from premises on which food is produced for direct consumption, and as such, includes restaurants, catering facilities and kitchens, including central and household kitchens. The Regulation, and its application within the Northern Ireland context, therefore could potentially have a significant impact on the future management of municipal wastes.

The Regulation on Animal By-Products

- IV.4 The Regulation, which is illustrated graphically in Figure IV.1, has taken a risk-based approach in defining the permitted disposal routes for animal by-products, by dividing ABP's into three categories, as follows:
- Category 1:** The highest risk category which includes material such as specified risk material and the carcasses of animals infected or suspected of being infected, with BSE. The permitted disposal routes are incineration and rendering in a Category 1 rendering plant.
- Category 2:** Includes materials such as ABP's which may present a risk of contamination with other animal diseases, for example, diseased animals, condemned material and animals which are not slaughtered for human consumption. The permitted disposal routes include incineration and rendering in a Category 1 or 2 rendering plant, or recycling for uses other than feeds after appropriate treatment.

Category 3: Essentially material derived from healthy animals slaughtered for human consumption. The permitted disposal routes are:

- Incineration
- Rendering in a category 1, 2 or 3 rendering plant
- Use in a petfood plant
- Use in a technical plant
- Treatment in a biogas or composting plant

IV.5 The strict technical requirements therefore mean that the Regulation will:

- No longer permit the disposal to sewer, land spreading and landfill for untreated products
- Ban the routine burial of fallen stock on the farm
- Allow the treatment of animal by-products in approved composting or biogas plants
- Maintain the existing UK ban on swill feeding
- Introduce controls on animal carcass incinerators
- Require the treatment of previously uncontrolled animal by-products such as blood and feathers

IV.6 With respect to Category 3 material, the Regulation permits treatment in composting and biogas plants, but sets strict technical requirements for processing, including a reduction in size to 12 mm in size, and treatment at 70° C for at least one hour in a closed vessel on approved premises. The compost or digestate could be used as fertiliser on non-pasture land (i.e.) land which is not grazed by animals.

IV.7 However, for plants which compost only catering wastes (and not animal by-products) the Regulation is flexible, allowing Member States to set their own standards for treatment and processing of these wastes, provided that those standards guarantee an equivalent level of pathogen removal.

The Existing Regulatory Framework

Great Britain

IV.8 The existing regulatory framework in Great Britain is provided by the Animal By-Products (Amendment) (England) Order 2002, which amended the law to permit the treatment of catering waste, which contains meat or which comes from premises handling meat, in approved composting and biogas facilities.

IV.9 The conditions in the 2002 Order, proposed by DEFRA for the composting of catering waste (based on a risk assessment commissioned in 2002) are considered to be as least as onerous as those imposed by the EU Regulation for Category 3 animal by-products.

Northern Ireland

- IV.10 At present, the Animal By-Products Order (Northern Ireland) 2002 does not address the enactment of all of the requirements required by the EU Animal By-products Regulation. In particular it does not deal with the composting or anaerobic digestion of catering wastes i.e. waste food originating in restaurants catering facilities and kitchens, including domestic kitchens.

The Current Position and Future Implications

- IV.11 At the present time, it is acknowledged that there is a high degree of uncertainty associated with the impact of the EU Regulation on Animal By-Products for the treatment and processing of catering wastes, which could have a significant effect on the provision of facilities for the management of municipal wastes.
- IV.12 At present, DEFRA are consulting on a draft Animal By-Products Order, and seeking views on the controls which will give effect to the Regulation in England. This outlines measures for composting catering waste, based on the findings of the risk assessment commissioned by DEFRA in 2002. DARD are currently drafting a similar ABPO Order for Northern Ireland, which will also be the subject of consultation in the near future.
- IV.13 Notwithstanding the above, the proposals may rule out the use of some traditional technologies, potentially requiring the composting of all catering wastes to be undertaken in enclosed vessels, or in enclosed windrows, in the future.
- IV.14 The cost of treating catering waste therefore seems likely to rise significantly, which will influence BPEO for these wastes and hence decisions by local authorities to meet the Landfill Directive targets.

Figure IV.1 EU Regulations

