



Resource use and waste generation are increasing in Ireland and the EU in tandem with increasing production and consumption of goods and services, including transport and tourism. Tackling the root causes and environmental impact of these trends is increasingly important for society. To progress the issue, it is necessary to consider sustainable production/service provision, resource use and consumption together with waste generation. With most raw materials and fuels being imported into Ireland, the full environmental impact in the country of origin is not always recognised. Additionally, virtually all products and materials themselves sooner or later become waste, necessitating appropriate management for recycling or disposal. As recycling and disposal activities themselves have environmental impacts, the best environmental option overall is to prevent or minimise waste where possible. With a domestic deficit in infrastructure for waste recovery and disposal, Ireland exports half of its hazardous waste and over half of its recyclable waste each year.

Implementing waste prevention, producer responsibility and integrated product policies in an increasingly competitive and globalised free-market economy is an ongoing challenge for all stakeholders. Policy at EU and national level has the overarching objective of breaking the link between economic growth and resource use and environmental impacts so as to move to more sustainable economic activity based on renewable energy and resources. National policy needs to be refined and implemented in a manner that fosters increased resource productivity (including materials, water and energy) in society as a whole. This means promoting less resource-intensive ways of meeting reasonable service and product needs for a growing population.

SUSTAINABLE
RESOURCE USE,
CONSUMPTION
AND WASTE

10

Introduction

Waste generation and resource use are at unsustainably high levels in Ireland and throughout the EU, and have increased in tandem with economic growth (EPA, 2008a, 2008b; EEA, 2007). In this context, resources include materials, products, water and energy. The challenge for society is to break the link between economic growth and the environmental impacts arising from commercial production/service provision, resource use, consumption and waste generation. Life-cycle thinking is needed in order to manage these environmental impacts at all stages from cradle to grave (or cradle), i.e. from extraction through production and consumption to waste for reuse or recycling (Figure 10.1; EEA, 2007).

Economic sectors causing greatest impact include energy and water supply, transport, mining and construction as well as agriculture. The import of fossil fuels and mineral resources into the EU as a whole is increasing as domestic extraction of these materials declines (EEA, 2007). This means that the environmental impact associated with resource

extraction is being transferred to other, often less developed and poorly regulated, parts of the world.

Prevention of waste is preferable to waste management and is at the highest level in the EU waste hierarchy. Reducing the use of resources will reduce waste generation, energy use, transport impacts and all consequential environmental impacts. In general, waste prevention can be achieved either by reducing the overall level of demand for goods and services or by using less, or less harmful, materials to meet reasonable needs. Prevention also seeks to reduce emissions, to reduce harmful substances in material streams and their dissipation, and to improve resource efficiency throughout the life cycle of a product or service.

The increased use of materials in the economy now will inevitably lead to the increased generation of waste at some point in the future. Some of the resources consumed in an economy add to the durable material stock (houses, roads, etc.). However, virtually all resources used eventually become waste,

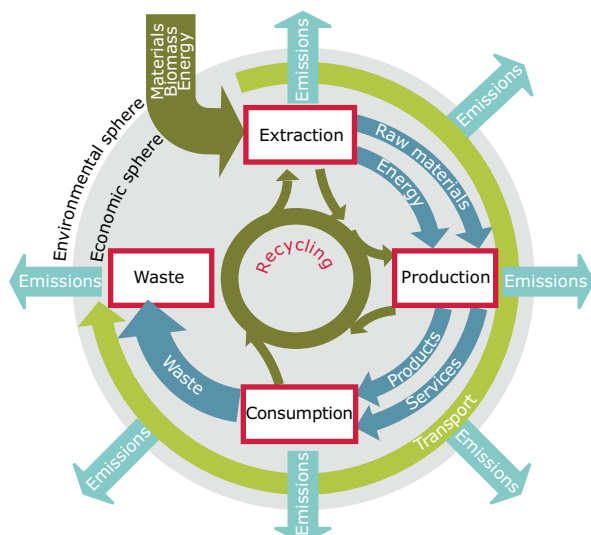
whether this takes place within days (e.g. food packaging), years (e.g. electrical equipment) or decades (e.g. buildings, infrastructure refurbishment) of consumption.

Prevention is reflected in emerging EU policy on the sustainable use of natural resources, integrated product policy and waste prevention and recycling (CEC, 2003a, 2003b, 2003c, 2004). However, achieving this in practice is considered particularly complex as, in a similar way to climate change issues, societal behaviour changes are needed now without any immediately tangible or apparent benefits (EEA, 2007).

Causes of Increasing Waste Generation

Rapid economic and population growth is acting in concert with increased per capita consumption of goods and services to drive up waste generation in Ireland. Patterns of consumption are shaped dynamically by a variety of interdependent social, cultural, political and economic changes in Ireland, Europe and the world. These include economic growth, globalisation, individualisation, new technology (including the Internet and telecommunications), targeted marketing/advertising, smaller households and changing populations (EEA, 2005).

Figure 10.1 Life-Cycle Chain from Extraction through Production to Consumption and Waste (Source: EEA, 2007)

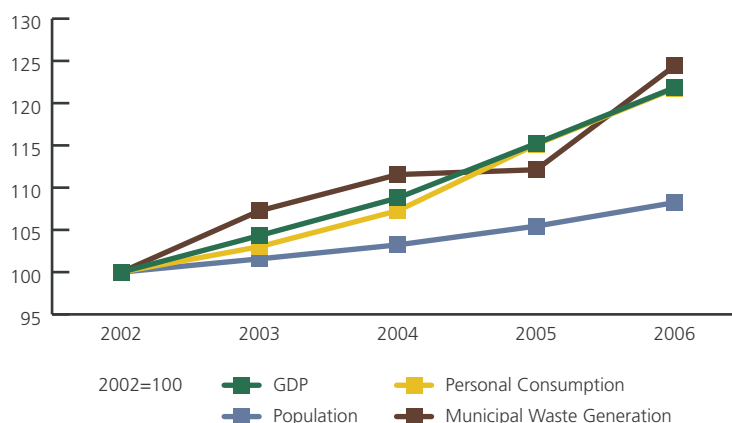


Between 2004 and 2006, both GDP and personal consumption of goods and services in Ireland grew by almost 18 per cent to €174,705 million and €82,483 million, respectively (CSO, 2007a). This has driven an increase in municipal waste generation in tandem with the growing economy (Figure 10.2).

Additionally, the population grew by over 8 per cent between 2002 and 2006 to over 4.2 million persons (CSO, 2007b). Apart from Cyprus, this represents the highest percentage change in population anywhere in the EU (CSO, 2007a). GDP in terms of purchasing power per capita in Ireland is now second only to Luxembourg within the EU (CSO, 2007a).

Life-cycle analysis indicates that the economic sectors causing greatest environmental impact include energy and water supply, transport, mining and construction as well as agriculture (EEA, 2007). Analysis of consumption of personal income at current market prices in Ireland indicates strong increases in spending in many of these categories (CSO, 2007a). Household consumption is considered particularly important as millions of consumers make the final decision relating to which, and how much, of different products or services they will consume. Consumption of food and drink, housing, personal travel (especially flights) and mobility as well as tourism are having growing impacts on the environment (EEA, 2005). Transport in particular is responsible for the generation of many hazardous waste streams including end-of-life vehicles, oils, filters, batteries and tyres (EPA, 2008c). In 2006, the number of new private cars had increased by 4 per cent to 173,273 compared to 2005 (CSO, 2007b). In 2005, the use of roads for

Figure 10.2 Municipal Waste Generation is Closely Linked to GDP and Personal Consumption (Source: EPA, 2008a)



transporting inland freight exceeded 98 per cent, with rail freight shrinking rapidly (CSO, 2007a). In fact, in 2006 less than 166 million rail freight traffic tonnes kilometres was recorded, a 45 per cent drop compared to 2005 (CSO, 2007b). In 2006, spending by tourists to Ireland exceeded €4,692 million while expenditure by Irish visitors abroad amounted to €5,318 million (CSO, 2007b).



Construction and demolition waste is driven by the increased development of houses and infrastructure including roads, railways and public buildings. Gross domestic physical capital formation, a monetary

statistical measure of construction output, increased by 12.5 per cent in 2006 (CSO, 2007c). The number of house completions has increased dramatically in the past decade to reach over 93,000 units in 2006, although this number fell significantly in 2007/8 (DEHLG, 2007a).

The Current Situation

Waste generation and management in Ireland have been reviewed periodically in National Waste Reports since 1995, and annually since 2001, with the most recent report covering waste arisings in 2006 (EPA, 2008a). Table 10.1 shows the principal categories of waste arising in Ireland in 2006, amounting to almost 31 million tonnes of non-agricultural waste.

Construction and Industrial Waste

Construction, mining and manufacturing wastes together constitute almost 83 per cent of total waste generated. Construction and demolition (C&D) waste amounted to over 16.8 million tonnes in 2006, a 13 per cent increase compared to 2005. Recovery of the stone and soil

fraction was reported as being at almost 89 per cent. Of the remaining fraction of C&D waste (e.g. blocks, concrete, wood, plastics), only 35.8 per cent was reported as being recovered. Industrial waste arises in industrial, mining and quarrying as well as from electricity, gas and water supply activities.



Overall, an estimated 9.2 million tonnes of industrial waste was generated in 2006, down 4.4 per cent on 2004. Mining and quarrying waste, at almost 4.8 million tonnes, is dominated by a small number of large facilities, which are regulated under the EPA Integrated Pollution Prevention and Control (IPPC) licensing regime. Over 80 per cent of industrial waste, including mining tailings, was either recovered or disposed of on-site of generation.

Non-hazardous manufacturing waste generated in 2006 amounted to over 3.8 million tonnes while hazardous waste from this sector amounted to less than 250,000 tonnes. Waste generated in relation to electricity, gas and water supply amounted to under 350 thousand tonnes. The recovery of industrial waste increased from 35.4 per cent in 2004 to 37.8 per cent in 2006.

Municipal Waste

Municipal waste is made up of waste from households and from commercial and other activities such as shops, offices, educational establishments and hospitals. To the general public, this is the most visible waste stream as it can be seen every day in wheelie bins, black bags and skips, or sometimes discarded in inappropriate locations. Municipal waste generation has been growing consistently since 2002 and increased by 11.3 per cent to almost 3.4 million tonnes in 2006 alone (Figure 10.3).

In terms of management, the amount of municipal waste landfilled increased by 8 per cent to almost 2 million tonnes in 2006. While recovery of municipal waste also increased to over 1.1 million tonnes (36%), over 75 per cent of the recyclable waste collected was exported for material recycling in 2006 (Figure 10.4).

Biodegradable municipal waste (BMW) typically comprises food and garden waste, wood, paper, cardboard and textiles, which can undergo biological decomposition. Approximately 74 per cent of household and commercial waste is biodegradable. In 2006, almost 2.3 million tonnes of BMW was generated in Ireland with 37.9 per cent of this being recovered and the remainder (over 1.4 million tonnes) landfilled. The landfilling of BMW can contribute to significant odours at landfills as well as the generation of greenhouse gases (e.g. methane) over the longer term.

In 2006, household waste generation (another component of municipal waste) increased by over 13 per cent to more than 1.9 million tonnes. Almost 400,000 tonnes of this waste was recovered (22.2 %) with the remainder being landfilled.

Table 10.1 Total Waste Generation in 2006 (Source: EPA, 2008a)

Waste Category	Tonnes	%
Construction and demolition waste	16,819,904	54.8
Mining and quarrying waste	4,782,614	15.6
Manufacturing waste	3,818,711	12.4
Municipal waste	3,384,606	11.0
End-of-life vehicles and scrap metal ¹	744,136	2.4
Contaminated soil	406,904	1.3
Energy, gas and water supply waste	333,341	1.1
Hazardous waste	314,072	1.0
Urban wastewater sludges	59,827	0.2
Drinking water sludges (wet weight) ²	30,047	0.1
Drinking water sludges (dry solids) ³	9,987	0.0
Dredge spoils ⁴	0	0.0
Total	30,704,149	100.0

¹ *Commission of the European Communities v. Kingdom of Spain*, 8 September 2005 (C-121/03) and *Commission of the European Communities v. Kingdom of Spain*, 8 September 2005 (C-416/02), available at www.curia.eu.int. ² Excludes municipal metals as these are already counted in the municipal waste stream. ³ The quality of this dataset is poor. In 2006, eight local authorities did not report on drinking water sludges generated in their functional areas. Some local authorities reported drinking water sludge as wet weight and others as dry solids. This figure represents the best estimate available. ⁴ Dredging was not carried out in 2006 at EPA-licensed operations.

This recovery rate is down slightly compared to 2005 (22.7%) as landfill increased by over 15 per cent in 2006. Uncollected household waste is estimated as over 205,000 tonnes in 2006.

In the same period, commercial waste generation grew by over 7.4 per cent to more than 1.3 million tonnes, of which 54.7 per cent was recovered and the rest landfilled.

Packaging waste is an important waste stream and has been growing strongly in recent years, increasing by 11 per cent to over 1 million tonnes in 2006. While recovery of packaging waste increased by 8 percentage points to a 57.3 per cent rate overall, landfilling of packaging waste also increased, by 15.5 per cent, outstripping the gains made in recovery.



Hazardous Waste

By definition, hazardous waste has specific properties that make it potentially harmful to human health and the environment. In 2006, over 284,000 tonnes of hazardous waste was generated – a reduction of 8 per cent compared to 2004 but an increase of 10 per cent compared to 2001. Almost 135,000 tonnes

Figure 10.3 Trends in Municipal Waste Generation 2002–2006: Increase over previous year indicated beside each bar (Source: EPA, 2008a)

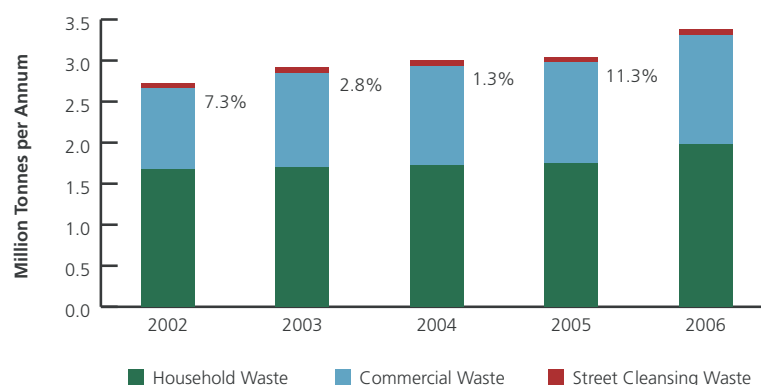
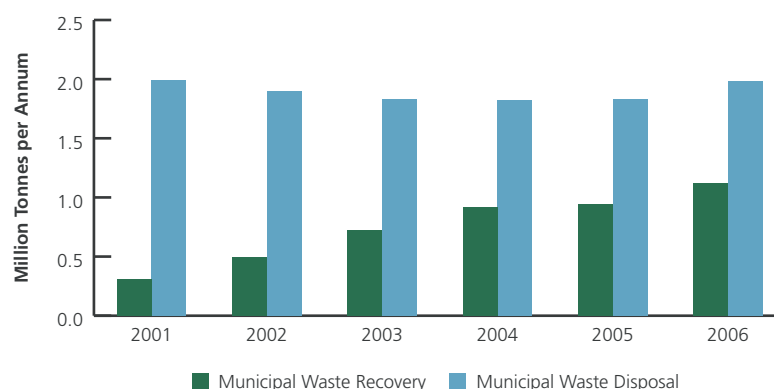


Figure 10.4 Trends in Recovery and Disposal of Municipal Waste (Source: EPA, 2008a)



(47%) was exported, approximately half of which was sent for thermal treatment. The largest quantity of hazardous waste was generated by industry and included solvents, waste oils, sludges and chemical wastes. However, households, small businesses, farms, healthcare and construction also generated large quantities of waste batteries, electrical equipment, healthcare risk waste, paint, sheep dip and fluorescent lamps. In addition, almost 407,000 tonnes of contaminated soil was removed from contaminated sites for treatment, with 90 per cent of this taking place abroad.

An estimated 30,000 tonnes of hazardous waste from households, small businesses and farms was classified as unreported in 2006 (EPA, 2008c). This means that particular products with hazardous properties were placed on the market but did not appear in commensurate amounts in the formal hazardous waste management system. Therefore, it is likely that this waste is mixed with general refuse and ends up, inappropriately, in landfills that are not designed to handle hazardous material.

Export of Recyclable Waste

In addition to export of hazardous waste and contaminated soil, significant quantities of separately collected recyclable waste materials are exported for final recovery and recycling. In 2006, almost 1.6 million tonnes of non-hazardous recyclable waste was exported. The majority of the first destination countries were within the EU but some recyclable waste was exported to third countries also. Just over 530,000 tonnes of recyclable waste was actually recycled in Ireland in 2006 (25 per cent of available material). Capacity to recycle waste materially (e.g. glass, steel or plastic) depends on achieving sufficient economic scale to compete internationally; at present a lack of scale is leading to the export of recyclable materials from Ireland.

Waste Management Infrastructure

In 2006, there were 29 licensed municipal landfills, 86 civic amenity sites and 1,919 bring banks countrywide for the collection and management of municipal waste. It is important that all waste management facilities are operated in a manner that avoids disamenity to maintain public confidence in their use and siting. A separate collection service for recyclable waste is available widely for households also. Collection services, particularly in the municipal sector, have seen dramatic changes in structure in recent years. Collection services are increasingly operated by the private sector on behalf of, in place of, or in competition with, local authorities. The ownership, direction and perceived regulatory conflicts in relation to waste need to be resolved without delay as this is negatively impacting on investment in the sector.

Mining waste tailings were managed internally within their workings. Inert waste was handled at five active facilities, at seven closed landfills undergoing restoration and at 11 licensed industrial facilities in 2006. There are 15 authorised hazardous waste treatment facilities in Ireland and one landfill authorised to handle certain types of asbestos. Thermal treatment facilities are in place at seven IPPC licensed companies to treat their own waste, but no commercial incineration is currently available in Ireland.

On a national basis landfill capacity appears to be adequate at present, although hazardous waste landfill and thermal treatment capacity is required if Ireland is to move towards greater self-sufficiency in the management of its hazardous waste (EPA, 2008c). There is an urgent need for infrastructure to enable Ireland to meet the targets on the diversion of biodegradable waste from landfill by 2010 (e.g. separate collection, composting, incineration, mechanical biological treatment).

Response to Date and Future Needs

EU and National Policy

Prevention is preferable to waste management and consequently is at the highest level in the EU waste hierarchy. In general, waste prevention can be achieved either by reducing the demand for goods and services or by using less, or less harmful, materials to meet reasonable needs. Prevention also seeks to reduce emissions, to reduce hazardous substances in material streams and their dissipation, and to improve energy and resource use efficiency throughout the life cycle of a product or service.

The Sixth EU Environment Action Programme recognises that 'waste volumes in the Community continue to rise, a significant quantity of these being hazardous, leading to loss of resources and to increased pollution risks'. This concern is reflected in other EU thematic strategies dealing with the sustainable use of natural resources, integrated product policy, environmental technologies action plan, and waste prevention and recycling (CEC, 2003a, 2003b, 2003c, 2004). These strategies have the common objective of improving 'resource efficiency and resource and waste management to bring about more sustainable production and consumption patterns'. Political agreement was reached at EU level in 2007 for a revised Waste Framework Directive, which is expected to be finalised in 2008 to replace the original 1975 Directive (EC, 1975). The agreement includes proposals for each member state to develop national waste prevention programmes.

This thinking is reflected in national waste policy, which places a high priority on the integration of waste management issues into the production/consumption cycle, so that waste arisings are stabilised and current trends in waste production reversed (DELG, 1998, 2002; DEHLG, 2004). The 2007 Programme for Government states that new ambitious waste management targets for maximum prevention, reuse, recycling to match best EU performance would be set, with 10 per cent or less of waste being consigned to landfill. Commitments are made *inter alia* to meet the targets in the Landfill Directive with regard to biodegradable waste, reduce waste management charges to householders, introduce more hazardous waste collection and introduce mandatory weight-based

waste charges. An international review of national waste policy, currently underway, needs to be completed without delay to provide certainty to investors in the sector.



Waste Management Planning

Sound management of waste protects human health and the quality of the environment while supporting the conservation of natural resources. In Ireland, there are 10 regional waste management plans in place and all were reviewed in 2004/5. These plans include provision for prevention activities in addition to segregation, collection, recovery, recycling and disposal of general waste. However, there is a need to coordinate the implementation of these plans nationally and their implementation needs to be reported on at least annually to ensure that satisfactory progress is being maintained.

It should be noted that the EPA licenses all landfill and most hazardous waste facilities and enforces these licences through its Office of Environmental Enforcement. The local authorities regulate the collection and movement of waste as well as many waste recycling facilities (SI 820 of 2007; SI 821 of 2007). A target for the recycling of 35 per cent of municipal waste by 2013 was exceeded in 2006, with a 36.1 per cent rate achieved (DELG, 1998; EPA, 2008a). A more ambitious target may now be appropriate to keep driving this recycling effort forward. However, the target to divert 50 per cent of household waste from landfill by 2013 is still some distance away, with only a 22.2 per cent recovery rate being recorded in 2006. A national strategy to deal with biodegradable waste has been published (DEHLG, 2006). There is an urgent need to implement this strategy fully and quickly, as Ireland is still some distance from meeting its Landfill Directive targets in this regard (Figure 10.5; EC, 1999).

A National Hazardous Waste Management Plan (2008–2012) was published in September 2008 to replace the original plan (EPA, 2001, 2008c). This plan includes detailed recommendations for a targeted prevention programme to

reduce hazardous waste arisings. Recommendations are also made to improve collection rates radically in order to reduce the amount of unreported hazardous waste. A national move towards self-sufficiency in the management of hazardous waste is recommended given that 47 per cent of hazardous waste was exported in 2006 (EPA, 2008a). A number of legacy issues are identified including closed landfills and contaminated soil and harbour sediments. This plan needs to be implemented in full by all relevant stakeholders.

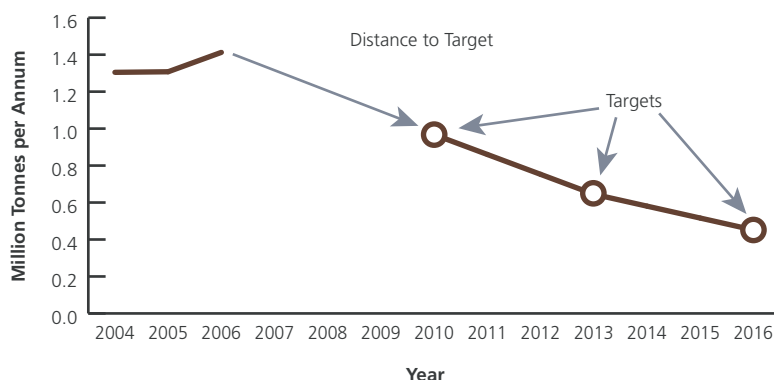
Industrial Waste

Many of the larger manufacturing and mining companies in Ireland are subject to EPA licensing under the IPPC licensing regime, and are required to minimise their emissions and waste arisings continually. These licences are enforced through the EPA's Office of Environmental Enforcement. The National Waste Prevention Programme (NWPP—see topic box) is also working to accelerate the prevention of industrial waste through its projects. In addition, the related Solvent and Decorative Paint Regulations provide for the regulation and periodic inspection of many smaller solvent-using commercial activities by way of Accredited Inspection Contractor (AIC) schemes (SI 543 of 2002; SI 199 of 2007).

Producer Responsibility Initiatives

A number of priority waste streams have been identified at national and EU levels such as those with large mass flows, with particular environmental impacts and containing hazardous or scarce substances. Producer Responsibility Initiatives (PRIs) are increasingly being introduced to require businesses

Figure 10.5 Biodegradable Waste Diversion from Landfill: Progress against Targets (Source: EPA, 2008a; EC, 1999)



involved in the manufacture, importation and sale of particular products or materials to take financial and physical responsibility for the recovery or proper disposal of these

goods at the end of their useful life. Regulations to implement PRIs for packaging, farm plastics, waste electrical and electronic equipment (WEEE), tyres and end-of-life vehicles

National Waste Prevention Programme

A National Waste Prevention Programme (NWPP) led by the EPA commenced in 2004 to mobilise action in this important area. To date, three annual reports have been published illustrating progress made with this programme. The programme includes the Local Authority Prevention Demonstration Programme, the Green Business Initiative, the Packaging Prevention Programme, Accredited Prevention Training and the Green Home Programme. Additionally, the National Waste Report is now published annually and the revision and implementation of the National Hazardous Waste Management Plan are being actively pursued. Enforcement and support are provided as appropriate for Producer Responsibility Initiatives including Waste Electrical & Electronic Equipment, Packaging, Restriction of Hazardous Substances, Solvents and Decorative

Paints. The regulations in relation to Ozone Depleting Substances, Persistent Organic Pollutants and Polychlorinated Biphenyls are implemented within NWPP also. There is particular focus on biodegradable waste as well as water and energy resource use.

To date, over €5 million has been committed to the programme from the Environment Fund. However, the overall scale of the programme will need to be increased significantly to match the rapid growth of consumption in order to have any realistic chance of impacting on national waste arisings. All stakeholders in the economy need to engage fully with more environmentally conscious production and consumption to assure a safer and more sustainable future for everyone.

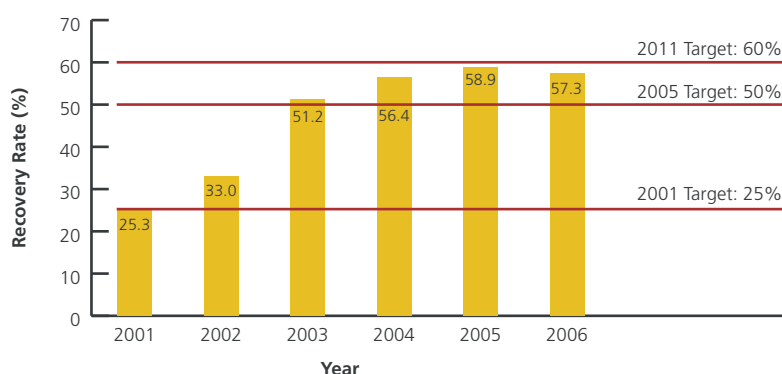
For more information, see www.nwpp.ie

(ELVs) have been put in place to deal with these specific waste streams (SI 341 of 2001; SI 340 of 2005; SI 282 of 2006; SI 664 of 2007; SI 798 of 2007). Substantial progress has been made in relation to packaging waste recovery, with a rate of 57.3 per cent achieved in 2006 compared to a target of 60 per cent to be achieved by 2011 (EPA, 2008a). Efforts must now be focused on the Packaging Prevention Programme co-sponsored by NWPP and Repak, given that packaging waste arising exceeded 1 million tonnes in 2006.

The Irish Farm Films Producers Group (IFFPG) is responsible for collecting farm plastics (bale wrap and bags) from farms for recycling in accordance with the Farm Plastics Regulations (SI 341 of 2001). In 2005 and 2006, 8,595 and 3,959 tonnes, respectively, of farm plastics was collected by IFFPG and other contractors and exported to Scotland for recycling as garden furniture. In 2007, regional events were held to collect backlogs of farm plastics.

Ireland introduced the WEEE Regulations in 2005 and good progress has been made in recovering this particular waste stream. In 2006, more than 52,000 tonnes of WEEE was collected, 65 per cent of which was recovered in Ireland with the balance exported to other EU countries. Over 30,000 tonnes of this WEEE was reported to have come from households, representing a per capita collection rate of 7.4 kg, which exceeds the EU target of 4 kg per person by 2006. However, a high collection rate implies that consumer product replacement rates are very high. There is a need to consider eco-design in the marketing of electrical products and to encourage repair/reuse of electrical equipment before it becomes waste. Ambitious material recovery rates for WEEE must be

Figure 10.6 Recovery of Packaging Waste and Progress towards Targets 2001–2006 (Source: EPA, 2008a)



achieved by 2008. The Restriction of Hazardous Substances (RoHS) Regulations seek to limit the amount of harmful substances that may be used in the manufacture of electrical and electronic equipment (SI 341 of 2005). A scheme will be in place by September 2008 to implement the EU Batteries Directive, which includes ambitious collection and treatment targets as well as measures to restrict hazardous substances in batteries (DEHLG, 2008). Similarly, the Decorative Paints Regulations set limits on the permitted solvent content of paint product that may be marketed to the trade or retail consumers (SI 199 of 2007). Arising from the end-of-life vehicles (ELVs) regulations, 79 Approved Treatment Facilities (ATFs) are now in place to service this waste stream (SI 282 of 2006). In 2006, an estimated 200,000 tonnes of scrap metal was recovered from waste vehicles (EPA, 2008a).

In a voluntary producer responsibility initiative, the construction industry accepted responsibility for achieving ambitious recycling targets for C&D waste (DELG, 1998). However, the recovery of C&D waste fell in 2006 (EPA, 2008a). Data reporting and prevention efforts within this sector need to be substantially improved to assure that this substantial waste stream is managed in an environmentally sound manner.

While large-scale illegal waste activities appear to have been eliminated, smaller-scale illegal waste activities persist, including fly-tipping and the burning of waste in backyards or in people's domestic fires. Many householders must now pay-by-use for waste collection, whether provided by the private or the public sector, which means that the 'polluter pays principle' is being applied to householders nationwide

Cleaner Production

Since 2000, the EPA has been supporting applied research on environmental technologies through the Cleaner Greener Production Programme (CGPP). Small to medium enterprises (SMEs) in particular are being encouraged to produce goods and services in a more environmentally friendly way by reducing emissions using cleaner production methods. CGPP focuses on three areas.

■ Production processes:

conserving raw materials, water and energy, substituting harmful raw materials and reducing quantity and harmfulness of all emissions and wastes.

■ Products:

reducing negative environmental impacts across the life cycle of the product from raw materials extraction to in-use, to end-of-life.

■ Services:

incorporating environmental considerations into the design and delivery of services.

To date, the EPA has committed over €3.7 million to these projects in three phases. Examples include the development of a zero waste computer, construction waste

reduction and an initiative on Greening Irish Hotels.

Overall, it is estimated that substantial environmental savings have been achieved each year in emissions to water, wastewater, greenhouse gases and solid waste. Additionally, participating companies have achieved substantial financial savings in input costs relating to water, energy, packaging and materials.

For further details, see www.epa.ie/researchandeducation

Enterprise Ireland has complementary programmes and funding available in relation to Environmentally Superior Products and Environmental Management Systems for SMEs. A scheme to promote green technologies is in development (see www.envirocentre.ie for further information).

Sustainable Energy Ireland offers programmes and grants for businesses and households to reduce consumption of energy and encourage the uptake of renewable sources (see <http://www.sei.ie> for further information).

(EPA, 2007). Ideally, charges should be clearly related to the weight of residual 'black' bin contents with ample opportunities for everyone to reduce their costs by reducing, reusing, composting or recycling their waste (EPA, 2006). Additionally, adequate waste management services should be available to all households throughout Ireland, regardless of location, to eliminate the phenomenon of uncollected household waste.

Challenges

Raising awareness and changing attitudes as well as behaviour in relation to resource use, consumption and waste in society are long-term projects, and continued commitment to these objectives in implementing national policy is essential. Particularly challenging is the increasingly globalised market economy where excessive consumption is seen as socially desirable. The National Waste Prevention Programme (NWPP)

needs to be continued, deploying resources commensurate with the scale of this challenge. All sectors, including household, industrial and commercial, need to be provided with the incentive and opportunities to prevent waste.

The implementation of the Regional Waste Plans needs to be coordinated and reported on at least annually to ensure that satisfactory progress is being maintained. To the maximum extent possible, and within the framework of the free internal market for recyclable waste within the EU, Ireland should develop indigenous facilities, markets and outlets to recycle its waste. This would have the benefit of processing materials closer to source (avoiding unnecessary transport), conserving resources, and creating domestic employment and investment opportunities. To this end, the work of the Market Development Group, which was established by the Department of the Environment, Heritage and Local Government in 2004, needs to be commenced without further delay (DEHLG, 2007b). The EU Landfill Directive (1999) specifies landfill targets that must be met progressively for biodegradable waste, and this remains a major challenge for Ireland in the coming years (EC, 1999). Prevention as well as recovery of packaging waste needs to be given focus. Irish regulations and local by-laws need to implement landfill bans, especially for packaging waste, biodegradable waste and other recyclable wastes. The increased diversion of recyclable wastes away from landfill would be expected to stimulate the recycling industry in Ireland and elsewhere.

In relation to other waste streams, C&D waste needs to be correctly managed and appropriate records need to be maintained by the sector. The National Hazardous Waste Management Plan needs to be fully implemented to ensure that an adequate infrastructure is in place to meet the needs of the state and to move towards greater self-sufficiency in the management of such waste. Producer responsibility has been very successful in Ireland, but we need to look beyond simple recovery and consider eco-design of products and services to avoid waste and hazardous substances.

Infrastructure deficits, particularly in relation to biodegradable, construction and hazardous wastes, need to be eliminated without delay. Investment in waste or recycling infrastructure, whether by private, public or private-public-partnerships, will only take place where there is a realistic prospect of sufficient financial returns to cover the high capital and running costs over many years within a stable policy environment. Any barriers to such critical investments need to be identified and, in consultation with all relevant stakeholders, managed to ensure that adequate waste management infrastructure is in place in Ireland to meet EU and national targets.

Summary

In the past decade Ireland has moved quickly from a position of almost total reliance on landfill for managing waste to a high level of recovery of recyclable materials. This has come about with investment in waste services and infrastructure, and the implementation of sophisticated Producer Responsibility Initiatives and Regional Waste Management Planning.

The main challenge for society is to break the link between economic growth and the environmental impacts arising from production, resource use, consumption and waste generation. Life-cycle thinking in policy implementation is needed in order to manage these environmental impacts at all stages from cradle to cradle, i.e. from extraction through production and consumption to reuse or recycling of resources. In this way, substantial progress can be made towards more sustainable production and consumption in Ireland.

Ongoing challenges remain: to ensure an adequate waste management infrastructure for Ireland, to address particular deficiencies in relation to hazardous waste management, and to divert biodegradable waste from landfill.

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