National Hazardous Waste Management Plan

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

2014 – 2020

Environmental Protection Agency

The Environmental Protection Agency (EPA) is a statutory body responsible for protecting the environment in Ireland. We regulate and police activities that might otherwise cause pollution. We ensure there is solid information on environmental trends so that necessary actions are taken. Our priorities are protecting the Irish environment and ensuring that development is sustainable. The EPA is an independent public body established in July 1993 under the Environmental Protection Agency Act, 1992. Its sponsor in Government is the Department of the Environment, Community and Local Government.

OUR RESPONSIBILITIES

LICENSING

We license the following to ensure that their emissions do not endanger human health or harm the environment:

- waste facilities (e.g., landfills, incinerators, waste transfer stations);
- large scale industrial activities (e.g., pharmaceutical manufacturing, cement manufacturing, power plants);
- intensive agriculture;
- the contained use and controlled release of Genetically Modified Organisms (GMOs);
- large petrol storage facilities;
- waste water discharges;
- dumping at sea.

NATIONAL ENVIRONMENTAL ENFORCEMENT

- Conducting over 1200 audits and inspections of EPA licensed facilities every year.
- Overseeing local authorities' environmental protection responsibilities in the areas of - air, noise, waste, waste-water and water quality.
- Working with local authorities and the Gardaí to stamp out illegal waste activity by co-ordinating a national enforcement network, targeting offenders, conducting investigations and overseeing remediation.
- Prosecuting those who flout environmental law and damage the environment as a result of their actions.

MONITORING, ANALYSING AND REPORTING ON THE ENVIRONMENT

- Monitoring air quality and the quality of rivers, lakes, tidal waters and ground waters; measuring water levels and river flows.
- Independent reporting to inform decision making by national and local government.

REGULATING IRELAND'S GREENHOUSE GAS EMISSIONS

- Quantifying Ireland's emissions of greenhouse gases in the context of our Kyoto commitments.
- Implementing the Emissions Trading Directive, involving over 100 companies who are major generators of carbon dioxide in Ireland.

ENVIRONMENTAL RESEARCH AND DEVELOPMENT

- Co-ordinating research on environmental issues (including air and water quality, climate change, biodiversity, environmental technologies).

STRATEGIC ENVIRONMENTAL ASSESSMENT

- Assessing the impact of plans and programmes on the Irish environment (such as waste management and development plans).

ENVIRONMENTAL PLANNING, EDUCATION AND GUIDANCE

- Providing guidance to the public and to industry on various environmental topics (including licence applications, waste prevention and environmental regulations).
- Generating greater environmental awareness (through environmental television programmes and primary and secondary schools' resource packs).

PROACTIVE WASTE MANAGEMENT

- Promoting waste prevention and minimisation projects through the co-ordination of the National Waste Prevention Programme, including input into the implementation of Producer Responsibility Initiatives.
- Enforcing Regulations such as Waste Electrical and Electronic Equipment (WEEE) and Restriction of Hazardous Substances (RoHS) and substances that deplete the ozone layer.
- Developing a National Hazardous Waste Management Plan to prevent and manage hazardous waste.

MANAGEMENT AND STRUCTURE OF THE EPA

The organisation is managed by a full time Board, consisting of a Director General and four Directors. The work of the EPA is carried out across four offices:

- Office of Climate, Licensing, Research and Resource Use
- Office of Environmental Enforcement
- Office of Environmental Assessment
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet several times a year to discuss issues of concern and offer advice to the Board.

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2014 - 2020

ISBN 978-1-84095-542-2

Price: €20

Published by the Environmental Protection Agency, Ireland

PRINTED ON RECYCLED PAPER

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Preface

This revised National Hazardous Waste Management Plan, for the Republic of Ireland, is prepared by the Environmental Protection Agency in accordance with Section 26 of the Waste Management Act 1996 as amended. The first such Plan was published in 2001 and was replaced by a second Plan published in 2008. This third Plan is a revision of the second Plan and will cover a period of six years from the date of publication (2014 - 2020).

This revised Plan sets out the priority actions that should be undertaken within the lifetime of the Plan in relation to: the prevention of hazardous waste; improved collection rates for certain categories of hazardous waste; steps that are required to improve Ireland's self-sufficiency in hazardous waste management and the continued identification and regulation of legacy issues (e.g. identification, risk assessment and regularisation of historic unregulated waste disposal sites). The key to achieving the revised Plan's objectives is effective implementation. A number of recommendations are made in the revised Plan. Section 26(5) of the Waste Management Act 1996 as amended states the relationship between the revised Plan and public bodies:

> "A Minister of the Government, a local authority and any other public authority in whom are vested functions by or under any enactment in relation to the protection of the environment shall have regard to, and in so far as it is considered by the Minister of the Government, local authority or other public authority to be appropriate to do so, shall take measures to implement or otherwise give effect to, recommendation[s] contained in the hazardous waste management plan."

Furthermore, the 2012 Government Policy on Waste Management[1] states:

> "The National Hazardous Waste Management Plan is a strategic level document designed to provide overall direction to policy and decision makers involved in the prevention and management of hazardous waste. All of the plan's recommendations are designed to reduce the environmental impact of hazardous waste. Local authorities are obliged to take these recommendations into account when they review their own waste management plans."

A summary of the revised Plan's recommendations is provided in the Executive Summary and is detailed in Chapter 8, which includes the nomination of responsible public authorities. All relevant public bodies as well as any other stakeholders and the public were invited to participate in the consultation period on the Proposed Revised Plan in 2013. A full Strategic Environmental Assessment (SEA) was carried out during the second Plan's development. Following SEA screening (report available at *www.hazardouswaste.ie*), it is considered that the modifications to the second plan do not need to be subjected to further SEA processes. The original SEA Targets and Indicators have been retained, where relevant, in the updated revised Plan. Appropriate Assessment screening of the revised Plan has also been undertaken (report available at *www.hazardouswaste.ie*). The revised Plan has been screened out for Appropriate Assessment, however, any specific plan or project proposals relating to or arising out of the recommendations in the revised Plan will need to be subjected to the Appropriate Assessment processes at the level of the more detailed sectoral plans and ultimately at individual project level, in accordance with the relevant legislation.

1 A Resource Opportunity - Waste Management Policy in Ireland - Department of the Environment, Community and Local Government July 2012

Executive summary

The Environmental Protection Agency (EPA) has prepared this revised National Hazardous Waste Management Plan for the Republic of Ireland covering a six-year period from the date of publication. This third Plan is a revision of the National Hazardous Waste Management Plan 2008 - 2012 and sets out the priorities to be pursued over the next six years and beyond to improve the management of hazardous waste, taking into account the progress made since the previous plan and the waste policy and legislative changes that have occurred since the previous plan was published.

The objectives of the revised Plan are:

1. To prevent and reduce the generation of hazardous waste by industry and society generally;

2. To maximise the collection of hazardous waste with a view to reducing the environmental and health impacts of any unregulated waste;

3. To strive for increased self-sufficiency in the management of hazardous waste and to minimise hazardous waste export;

4. To minimise the environmental, health, social and economic impacts of hazardous waste generation and management.

This revised Plan is made under Section 26 of the Waste Management Act 1996 as amended. A full Strategic Environmental Assessment (SEA) was carried out during the second Plan's development. Following SEA screening, it is considered that the modifications to the previous plan do not need to be subjected to further SEA processes. The original SEA Targets and Indicators, where relevant, have been retained in the updated revised Plan. The SEA of the second plan and the SEA screening report of the revised Plan are available at *www.hazardouswaste.ie.* Appropriate Assessment screening of the revised Plan has also been undertaken (report available at *www.hazardouswaste.ie*). The revised Plan has been screened out for Appropriate Assessment, however, any specific plan or project proposals relating to or arising out of the recommendations in the revised Plan will need to be subjected to the Appropriate Assessment processes at the level of the more detailed sectoral plans and ultimately at individual project level, in accordance with the relevant legislation.

Hazardous waste generation and management

Waste is classified as being hazardous when it displays one or more of the hazardous properties listed in the Second Schedule of the Waste Management Act as amended[2] (e.g. explosive, oxidizing, flammable, irritant, harmful, toxic, carcinogenic). The relevant property or properties are determined by testing or, where applicable, concentration-based criteria.

The EPA National Waste Reports provide data on Ireland's waste generation and management including hazardous waste. The largest quantity of hazardous waste is generated by Irish industry and includes such materials as industrial solvents, waste oils, industrial sludges and chemical wastes. Households,

2 European Communities (Waste Directive) Regulations 2011 (S.I. 126 of 2011)

small businesses, farms and the healthcare and construction sectors also generate quantities of hazardous waste including batteries, electrical equipment, healthcare risk waste, solvent-based paint and varnish waste, sheep dip and fluorescent lamps.

The overall quantity of hazardous waste managed in 2011 (most recent data) was 287,376 tonnes, representing a <1% reduction on that reported for 2009 (Table 1). In 2011, 67,772 tonnes of hazardous waste was treated *on-site of generation* at Integrated Pollution Prevention and Control (IPPC) licensed facilities, with 98,838 tonnes treated *off-site in Ireland* by a network of authorised hazardous waste treatment facilities (Table 1). In the same year, 149,037 tonnes of hazardous waste was *exported* for treatment and disposal abroad, mostly for thermal treatment (incineration and use as fuel), but also for metal recovery, solvent recovery and landfill. This represents a <1% reduction on the volume exported in 2009.

Table 1 Summary of hazardous waste management, 2006-2011 (excluding contaminated soil)

Category	2006	2007	2008	2009	2010	2011
[3] On-site at industry (t)	88,409	82,732	72,038	74,668	76,655	67,772
[4] Off-site in Ireland (t)	60,872	91,240	113,839	89,992	93,048	98,838
Exported (t)	134,904	147,542	157,207	150,395	143,180	149,037
[5] Total (t)	**284,184**	**304,941**	**319,098**	**289,910**	**287,874**	**287,376**

Source: National Waste Report 2011 (see current web version, http://www.epa.ie/pubs/reports/waste/stats)

Figure 1 illustrates the long-term trend in the location of treatment of hazardous waste. It shows that the on-site treatment of hazardous waste decreased from 2010 to 2011. The *off-site* treatment of hazardous waste in Ireland has steadily increased over the years, although it is down from a peak in 2008. The export of hazardous waste has become the established outlet for roughly half of all Irish hazardous waste. Please see Figure 6 for destinations (2011), all of which are EU Member States.

3 "On-site at industry" refers to hazardous waste recovered or disposed of on-site at the industrial facility where it was generated, under EPA licence.

4 "Off-site in Ireland" refers to waste sent to EPA licensed commercial hazardous waste treatment facilities for recovery or disposal.

5 In 2011 a reported 28,270 t of hazardous waste was blended at facilities in Ireland prior to export as a waste for further treatment (27,058 t reported as exported for use as fuel in cement kilns, a further 1,212 t hazardous waste was blended prior to export for incineration abroad). These quantities are correctly counted in both the treated "off-site in Ireland" row and the "exported" row. However, they have been discounted in the total row to avoid double counting in the total amount of hazardous waste managed. Similar discounting also took place in the "total" figure relating to 2007, 2008, 2009 and 2010 to avoid double counting in the total amount of hazardous waste managed.

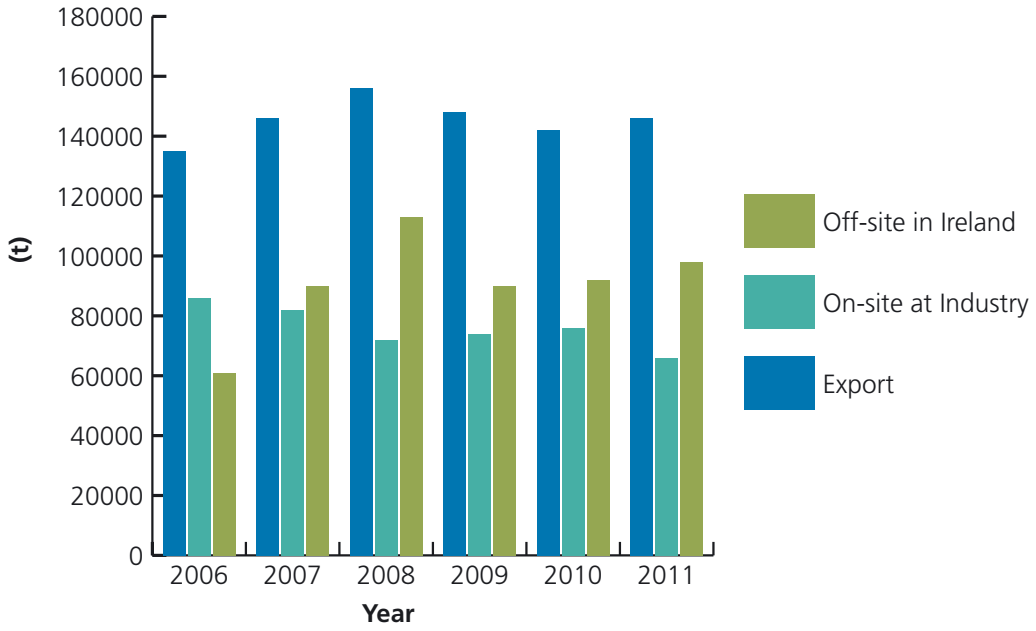

Figure 1 Trends in the location of hazardous waste treatment, 2006-2011

With the reduction in building/development activity, the volume of contaminated soil managed declined from 493,107 tonnes in 2008 to 17,297 tonnes in 2011. In 2011, 10,203 tonnes of contaminated soil was exported for treatment, with the remainder treated at a single facility in Ireland. This is in stark contrast to 2008, when 449,574 tonnes of soil was exported for treatment and 43,533 tonnes was treated domestically.

The revised Plan makes 27 recommendations (see Chapter 8), dealing with:

- prevention of hazardous waste;
- collection of hazardous waste and the enforcement of hazardous waste regulations;
- moving towards self-sufficiency in hazardous waste management;
- regulatory aspects;
- legacy issues;
- north-south cooperation;
- guidance and awareness; and
- plan implementation.

A summary of these recommendations is presented below.

Prevention

Prevention projects to reduce the generation of hazardous waste in certain priority sectors (pharmachem, agriculture, healthcare, households, publishing & printing and transport) should continue to be led by the EPA under the National Waste Prevention Programme. Prevention initiatives should be incorporated into Regional Waste Management Plans and the Green Public Procurement Action Plan should provide for the substitution and reduction in use of hazardous materials. Waste characterisation studies of certain waste streams are also recommended to evaluate the reduction of the hazardous content of such wastes.

Collection

A comprehensive and accessible network of local drop-off facilities for householders and small businesses is recommended to tackle the problem of "unreported" hazardous waste. Enforcement activities should continue to focus on issues such as unauthorised burning of waste oil in order to increase collection and prevent environmental pollution. The potential for producer responsibility obligations for a number of hazardous waste streams should be given priority consideration.

Self-sufficiency

The objective of moving towards increased self-sufficiency and minimising exports continues to be recommended, where it is strategically/environmentally advisable, and technically and economically feasible. If Ireland were to become self-sufficient, suitable hazardous waste treatment options would be required.

Regulatory

Consolidation of waste legislation and cooperation in enforcement is recommended. A review of waste licensing/permitting legislation is recommended in order to establish a proportionate regulatory mechanism, including relief, to facilitate collection, transport and temporary storage of certain hazardous wastes from small sources pending proper treatment.

Legacy issues

Old waste disposal sites, especially those that to a significant extent may have involved the disposal of hazardous waste, should continue to be managed (i.e. identified, risk assessed and regularised) in accordance with the Code of Practice drawn up by the EPA's Office of Environmental Enforcement and relevant legislation, where required.

North-south cooperation

The revised Plan recommends that any proposals for hazardous waste recovery/disposal infrastructure should take all-island considerations into account for capacity planning purposes. Cooperation between appropriate authorities on both sides of the border concerning hazardous waste management issues should be explored.

Guidance and awareness

A key aspect of proper hazardous waste management is guidance and awareness. During implementation of the second Plan, the EPA developed prevention resources for certain sectors. Such resources should continue to be disseminated (e.g. the Green Healthcare Programme). Local authorities and relevant sectoral organisations should also avail of appropriate media (e.g. social media) to inform the public and small businesses of hazardous waste collection services.

Implementation

It is important to note that policy makers, regulators, product producers, importers, generators and holders of hazardous waste all play a vital role in ensuring that the generation of such materials is minimised, and the materials are collected and treated correctly in accordance with the waste hierarchy.

Each of the 27 recommendations in the revised Plan has a responsible body or bodies identified. The principal implementing bodies are the Department of the Environment, Community and Local Government, the Environmental Protection Agency, and the local authorities, along with facility operators and holders of hazardous waste.

Targets and indicators have been included in the revised Plan to allow for monitoring its implementation (management indicators) and any environmental effects of this (environmental indicators). The EPA will also devise sectoral and waste stream specific indicators in the early part of the revised Plan period to help monitor implementation of the revised Plan's objectives.

The EPA will carry out a mid-term review of the revised Plan's implementation using data from the National Waste Reports and with the input of the National Waste Prevention Committee.

1. Introduction

Waste is classified as being hazardous when it displays one or more of the hazardous properties listed in Annex III of the Waste Framework Directive (e.g. explosive, oxidizing, flammable, irritant, harmful, toxic, carcinogenic). The relevant property or properties are determined by property testing or, where applicable, concentration-based criteria.

The Directive has been transposed into national legislation by the European Communities (Waste Directive) Regulations, 2011 (S.I. No. 126 of 2011). Industry is the largest generator of hazardous waste in Ireland, giving rise to hazardous waste materials such as industrial solvents, sludges, oils and other hazardous chemicals. Households, small businesses, farms and the healthcare and construction sectors also generate substantial quantities of hazardous waste such as lead-acid batteries, waste electrical and electronic equipment, healthcare risk waste, solvent-based paints and varnishes, pesticides, waste oils and asbestos.

This revised National Hazardous Waste Management Plan (hereafter referred to as the "revised Plan") sets out the priorities to be pursued over the next number of years to continually improve the management of hazardous waste in the Republic of Ireland. The revised Plan has been prepared in accordance with Section 26 of the Waste Management Act 1996 as amended. The Environmental Protection Agency (EPA) is required to develop a National Hazardous Waste Management Plan that has regard to:

- the prevention and minimisation of hazardous waste;
- the recovery of hazardous waste;
- the collection and movement of hazardous waste; and
- the disposal of such hazardous waste as cannot be prevented or recovered.

The Plan must be evaluated at least once every six years. The first National Hazardous Waste Management Plan was published by the EPA in 2001. In 2008 it was extensively reviewed and revised subject to Strategic Environmental Assessment (SEA), and replaced by a second Plan. A third Proposed Revised Plan was prepared and a period of public consultation on the Proposed Revised Plan was carried out between October and December 2013. A total of 21 submissions were received (refer to Appendix A). A summary of the principal issues raised and a compendium of submissions and responses is available at *www.hazardouswaste.ie*. This third revised Plan updates the second Plan with new data while leaving its principal components in place. The revised Plan continues to recommend a number of activities that are ongoing under the previous Plan, and includes updated recommendations to ensure that the Plan continues to be relevant for the next 6 years and beyond.

1.1 What can, and cannot, be achieved by this revised Plan

The National Hazardous Waste Management Plan makes recommendations, in accordance with Section 26(2) of the Waste Management Act 1996 as amended, for actions and infrastructure that the EPA considers necessary and appropriate to achieve the stated plan objectives. The recommendations are based on an analysis of statistical data and the policy and business environment surrounding hazardous waste management. However, two significant public policy constraints were taken into account in preparing this revised Plan.

First, current government policy indicates that large-scale public investment in hazardous waste infrastructure will not be made. The hazardous waste industry in Ireland is entirely owned and operated by the private sector. No public authorities are involved in the commercial collection of hazardous waste, the provision of storage facilities or the treatment of hazardous waste. The only exception is the provision of civic amenity sites by local authorities for the deposit of small quantities of household hazardous waste. A recommendation in the revised Plan at variance with this general policy concerns the possible public provision of hazardous waste treatment[6] capacity (e.g. landfill capacity). This is indicated in the revised Plan as a clear strategic need in order for hazardous waste to be treated in Ireland and export to be reduced.

Second, the EPA, the public sector generally and the revised Plan can only seek to influence, but cannot control, private sector investment decisions. Therefore, options for private sector investment are presented solely as options and the revised Plan does not seek to carry out a detailed evaluation of the actual economic feasibility of any such potential investments. Any proposals for hazardous waste management infrastructure would however be expected to have regard to the revised Plan and describe how its overarching objectives would be met.

Additionally, in order to be granted an industrial emissions licence, a waste licence or a permit, operators must demonstrate, among other things, that environmental pollution will not be caused by the operation of any proposed facility.

The revised Plan can seek to have some influence over the implementation by public bodies of its recommendations, as provided for in Section 26(5) of the Waste Management Act 1996 as amended. Local authorities have taken steps in recent years to improve the collection of household hazardous waste (e.g. civic amenity sites, mobile collection). Further investment by local authorities in household hazardous waste collection facilities, coupled with prevention, enforcement and awareness activities, is important to help meet the revised Plan's objectives. It is essential that local authorities receive the funding, resources and policy support required to enable them to implement these recommendations. Other, less capital- and resource-intensive, activities are proposed, and it is considered reasonable to presume that such recommendations can and will be implemented in a timely manner. It is important to note that product producers, importers, generators and holders of hazardous waste have a vital role to play in ensuring that the generation of such materials is minimised and that these materials are collected and treated correctly in accordance with the waste hierarchy.

The EPA, through this revised Plan, continues to encourage the development and introduction of new and innovative technologies and techniques for treating hazardous waste where they meet legislative, regulatory, policy and Best Available Techniques (BAT) criteria.

6 "Treatment" means recovery or disposal operations, including preparation prior to recovery or disposal (EU Waste Framework Directive 2008/98/EC).

1.2 Structure of this document

The structure of the revised Plan generally follows the layout of the previous plan, as outlined in Figure 2. The first three chapters provide an introductory overview of the revised Plan. Relevant international, EU, and national legislation and policy influencing the management of hazardous waste is outlined, and a profile of the generation and management of hazardous waste in Ireland for a number of years up to and including 2011, for which data are currently publicly available, is discussed. Chapter 4 focuses on the area of waste prevention and, similar to the previous plan, continues to target key sectors in the area of hazardous waste prevention.

Chapter 5 describes hazardous waste that is considered to be unreported or uncollected, and hazardous waste issues that have been presenting certain challenges in recent times.

Chapter 6 describes the current situation with regard to principal hazardous waste treatment options used for hazardous waste generated from Ireland, options for alternative treatment technologies and other key issues for consideration. Chapter 7 provides an update on legacy issues with a focus on closed landfills and contaminated soil in addition to information on extractive waste from historical sites and contaminated sediments. Finally, Chapter 8 outlines key actions and associated responsibilities for the implementation of recommendations arising from this National Hazardous Waste Management Plan.

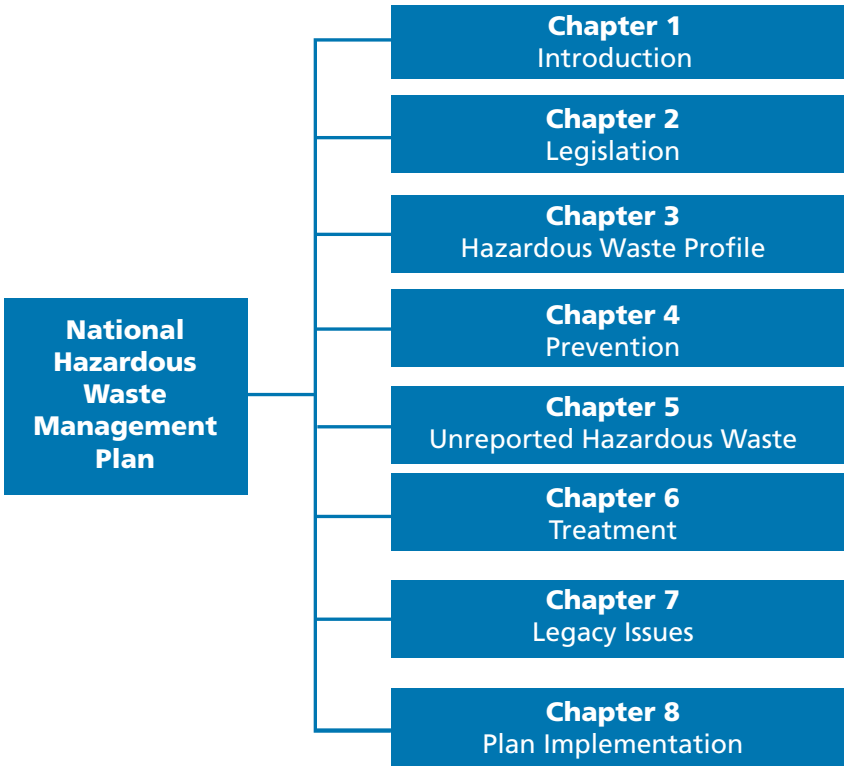

Figure 2 Structure of the revised National Hazardous Waste Management Plan

1.3 The objectives of this revised Plan

Section 26 of the Waste Management Act 1996 as amended, sets out the overarching objectives for the National Hazardous Waste Management Plan. In this context, the following objectives are included as priorities for the revised Plan period:

1. To prevent and reduce the generation of hazardous waste by industry and society generally;
2. To maximise the collection of hazardous waste with a view to reducing the environmental and health impacts of any unregulated waste;
3. To strive for increased self-sufficiency in the management of hazardous waste and to minimise hazardous waste export;
4. To minimise the environmental, health, social and economic impacts of hazardous waste generation and management.

Any actions relating to or arising out of any of the recommendations in the revised National Hazardous Waste Management Plan should comply fully with all relevant EU and national legislation.

1.4 Strategic Environmental Assessment & Appropriate Assessment

A full SEA was conducted concurrent with the development of the second Plan in 2008. This fulfilled the requirements of the SEA Directive (2001/42/EC)[7] and the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004, S.I. No. 435 of 2004. Best practice and relevant published guidance were followed throughout the process. Figure 3 shows the principal steps in carrying out SEA.

Figure 3 Summary of Strategic Environmental Assessment stages

In 2011, an Implementation Report was published on the second Plan as part of the monitoring step in SEA. This evaluation indicated that no unforeseen adverse effects on the environment had become evident arising from the implementation of the second Plan. It was concluded that the original SEA was soundly based. It was noted from the EPA National Waste Report 2010, published in 2012, that hazardous waste volumes are static or declining. In accordance with Article 9 of the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I. No. 435 of 2004) as amended, the EPA must decide if modifications to the National Hazardous Waste Management Plan 2008-2012 would or would not be likely to have significant effects on the environment, taking account of relevant criteria set out in the Regulations. Following SEA screening and consultation with the relevant SEA Environmental Authorities, it is considered that SEA of the modifications to the second plan is not required. Further information is available at *www.hazardouswaste.ie*. The original SEA Targets and Indicators have been retained in the revised Plan, where relevant, and a further Implementation/SEA Monitoring Report will be completed during the next implementation period.

7 Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment, OJ L 197, 21.7.2001, pp. 30–37

The revised Plan has also been screened for Appropriate Assessment in accordance with Article 6(3) of the Habitats Directive[8] and Part 5 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). The Appropriate Assessment screening report is available at *www.hazardouswaste.ie*. The revised Plan has been screened out for Appropriate Assessment, however, any specific plan or project proposals relating to or arising out of the recommendations in the revised Plan will need to be subjected to the Appropriate Assessment processes at the level of the more detailed sectoral plans and ultimately at individual project level, in accordance with the relevant legislation.

8 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

1.5 Implementation of the Second Plan

The second Plan (2008-2012) set out a number of recommendations for the prevention, collection and treatment of hazardous waste. A report[9] on the second Plan's implementation was prepared in 2011. The findings of this report are summarised in the following Tables 2-5.

Table 2 Were the second Plan's objectives achieved?

Objective	Comments
To reduce the generation of hazardous waste by industry and society generally	Amounts of hazardous waste generally and in industry are static or declining.
To minimise unreported hazardous waste with a view to reducing the environmental impact of this unregulated waste stream	Levels of unreported hazardous waste are likely to have declined due to impact of economic downturn, WEEE, Batteries, ELV regulations and CAS, garages and farm initiatives. New estimates needed to confirm this trend.
To strive for increased self-sufficiency in the management of hazardous waste and to reduce hazardous waste export	Levels of exported waste have stayed steady while the proportion of hazardous waste being treated in Ireland is slowly declining.
To minimise the environmental, social and economic impacts of hazardous waste generation and management	EPA licensing/enforcement is minimising emissions in relation to licensed sites. Waste segregation and CAS collections have increased, as has the collection of batteries, ELV and WEEE waste. However, data on the direct impacts of hazardous wastes are not readily available.

Colour key:

Objective is being achieved
Objective is not being achieved
Objective is being partly achieved, or no change
Only indirect (input) data on the objective is available

Table 3 Were the second Plan's recommendations implemented?

Implementation Status	Number of Recommendations	Percentage of 29 Recommendations
Recommendation is being implemented	18	62%
Recommendation implementation is in progress	6	21%
Only limited information on the implementation of the recommendation is available	4	14%
Recommendation has not yet been implemented	1	3%

9 National Hazardous Waste Management Plan (2008-2012) Implementation Report 2011 (*www.hazardouswaste.ie*)

Table 4 Were the second Plan's targets achieved?

Target	Comments
Initiate and implement hazardous waste prevention projects	Incorporated into the National Waste Prevention Programme (NWPP)
Reduce the generation of hazardous waste relative to production at targeted, participating or reporting organisations or sectors	Incorporated into NWPP
Minimise the generation of unreported hazardous waste	Updated data on unreported hazardous waste is not currently available
Increase the deposit of household and small business hazardous waste at civic amenity sites; other static collection points; and mobile services.	Data suggests increase in household hazardous waste is being collected including WEEE, Batteries and at CAS
Establish new producer responsibility obligations	Not yet progressed due to Department of the Environment's resources being directed at implementing WEEE, Batteries, ELV and other existing schemes. The programme for government states that consideration will be given to the extension of Producer Responsibility Initiatives.
Increase on-site treatment of hazardous waste generated at IPPC-licensed facilities	The evidence is that manufacturers prefer to let specialist external companies deal with hazardous waste
Increase off-site treatment of hazardous waste in Ireland	Hazardous waste volume treated off-site in 2009 up 48% compared to 2006
Reduce export of hazardous waste	While volume exported is fairly stable, the proportion of hazardous arisings has increased from 48% in 2006 to 52% in 2009
Identify, assess and remediate as necessary all sites where hazardous waste to a significant extent was disposed of in the past	Identification and assessment process has been started, but completing remediation will be lengthy and expensive

Colour key:

Target is being achieved
Target is not being achieved
Target is being partly achieved, or no change
Only indirect (input) data on the target is available

Table 5 Were the SEA environmental targets achieved?

Target	Comments
Minimise exceedances of emission limits to water and air from licensed hazardous waste facilities	Between 2008 and 2011, 31 ELV exceedances were noted among 15 IPPC/Waste licensees (handling significant amounts of hazardous waste) whose files were examined. 13 other licensees had no ELV exceedances noted[10].
Legacy hazardous waste disposal sites to be managed in accordance with Code of Practice	Code of Practice published and Tier 1 Risk Assessments are underway.
In the vicinity of hazardous waste incinerators, no increase in dioxin levels in ambient environment	All samples well below EU action and limit values
Maximise the generation of energy from renewable sources	Amounts of hazardous waste used for energy recovery (R1) increasing but half of this is via export.
Minimise distance travelled by hazardous waste	Data on tonnes-kilometres is not available to determine whether target actually achieved. However, export figures are fairly stable.
Minimise export of hazardous waste and move towards self-sufficiency	Levels of exported waste have stayed fairly steady while the proportion of hazardous waste being treated in Ireland is slowly declining.
Minimise the generation of unreported hazardous waste	Updated data on unreported hazardous waste is not currently available.
Increase the in situ treatment of contaminated soil	Nine IPPC companies are treating historically contaminated sites in-situ, however, there are no estimates of the volumes of soil involved.
Increase the treatment of contaminated soil in Ireland	Large quantities generated 2004 and 2008 were largely exported for treatment.
Develop any new hazardous waste facilities on previously used land or brownfield sites	No specific information is available in relation to this target.
Avoid loss or damage to designated sites from siting of hazardous waste facilities	No specific information is available in relation to this target.
Minimise major incidents of unauthorised disposal of hazardous waste	Apart from occasional reports of diesel laundering residue, no other major incidents have been identified.
Minimise complaints relating to hazardous waste facilities	Between 2008 and 2011, 74 complaints were made against 15 IPPC/Waste licensees (handling significant quantities of hazardous waste) whose files were examined. 13 other licensees received no complaints.

Colour key:

Target is being achieved
Target is not being achieved
Target is being partly achieved, or no change
Only indirect (input) data on the target is available

10 Please refer to Section 5 of National Hazardous Waste Management Plan (2008-2012) Implementation Report 2011 (*www.hazardouswaste.ie*) for further information on follow-up actions to non-compliances.

The EPA, principally through the National Waste Prevention Programme (marketed as BeGreen), pursued the following hazardous waste related projects during the implementation period of the second Plan 2008-2012 and a number of activities are ongoing:

- Household hazardous waste prevention was addressed through the Green Home project (*www.greenhome.ie*), based in part on materials developed by the Local Authority Prevention Demonstration (LAPD) programme;
- An Economic Study of Solvent Recycling & Treatment in Ireland was completed and communicated to the Pharmachem sectoral representative group;
- A study was completed on a National Difficult Waste Facility (including hazardous waste landfill) involving inter-Departmental/Agency consultation;
- A draft Code of Practice/Guidance Document for Civic Amenity Sites handling hazardous waste including training resources was developed and circulated to key stakeholders for comment at the end of 2013;
- A limited Farm Hazardous Waste study was undertaken to try to identify and quantify the types and quantities of hazardous wastes generated on farms;
- The EPA and the Department of Agriculture, Food and the Marine (DAFM) jointly researched and prepared the *7 Steps: Good Practice Guide for Empty Pesticide Containers* and a supporting technical background document. The Guide provides information on triple rinsing of pesticide containers. Only triple rinsed pesticide containers managed in accordance with the Guide can be classified as non-hazardous wastes. The Guide was widely distributed to the farming community and was made available at over 200 bring-centres for farm plastics recycling operated by the Irish Farm Film Producers Group (IFFPG)[11]. Technical support was provided for the development of a collection scheme for triple-rinsed farm plastics;
- The EPA and DAFM carried out joint inspections of the bring-centres in 2012 and 2013 to provide technical support to IFFPG and Farm Plastics Recycling Limited (FPR Ltd) in their collection and recovery of pesticide containers and to raise awareness among the farming community about the importance of triple rinsing;
- A Green Healthcare programme (*www.greenhealthcare.ie*) which includes a focus on healthcare hazardous waste was established;
- A Garages Best Practice Guidance was prepared in 2010 and widely distributed to the sector;
- Work continued on the implementation of Polychlorinated Biphenyls and Persistent Organic Pollutants Regulations including the preparation of a *National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants* which was published in 2012 (see *www.pops.ie*);
- EPA staff in co-operation with other statutory bodies continued the enforcement and/or monitoring of Waste Electronic & Electrical Equipment (WEEE), Restriction of Hazardous Substances (in EEE), Solvents, Deco-paints, Packaging (Essential Requirements), Ozone Depleting Substances, Fluorinated Greenhouse Gases, Batteries and End-of-Life Vehicles Regulations; and
- EPA licensing and enforcement (through the EPA Office of Environmental Enforcement) of IPPC and waste sectors continued to control hazardous waste arisings and treatment in the incumbent sectors.

11 A copy of the Guide and supporting technical background paper is available at *www.epa.ie/pubs/advice/waste/farm*.

It is apparent that good progress has been made in Ireland during the second Plan's implementation period in relation to a number of its recommendations, objectives and targets, and generally in the management of hazardous waste. It is also apparent, however, that more progress needs to be made in some key areas such as the establishment of producer responsibility obligations for certain hazardous wastes and in achieving greater self-sufficiency in managing Ireland's hazardous waste. More remains to be done, particularly in relation to hazardous waste prevention, product/service eco-design, the collection of a greater proportion of products containing hazardous materials at end of life and self-sufficiency in relation to treatment. The issues remain a significant challenge for society given the number of players and the globalised economic, market and societal influences involved. Since the publication of the previous plan, Ireland has experienced a significant economic downturn which, while reducing the quantity of hazardous waste arising, has inevitably impacted on resources to help achieve the previous plan's objectives. Pressure will continue to come both from within the country where we seek to ensure our green image and externally from EU policy. The recently published proposal of the EU Commission for the 7th Environment Action Programme[12] states:

> "Hazardous waste will need to be managed so as to minimise significant adverse effects on human health and the environment, as agreed at the Rio+20 Summit. To achieve this, market-based instruments that privilege prevention, recycling and re-use should be applied much more systematically across the EU. Barriers facing recycling activities in the EU internal market should be removed and existing prevention, re-use, recycling, recovery and landfill diversion targets reviewed so as to move towards a 'circular' economy, with a cascading use of resources and residual waste close to zero."

12 European Commission COM(2012) 710 final "Living well within the limits of our planet" - Proposal for a general Union Environment Action Programme

2. Hazardous waste legislation

The management of hazardous waste is governed by comprehensive legislation. The legislation principally originates in EU directives and regulations and is implemented in Ireland by the Waste Management Act 1996 as amended, related statutory instruments, and other acts. This chapter provides a listing of the principal EU[13] and Irish[14] statutes governing:

(a) requirements to prevent hazardous waste and restrict the use of hazardous substances in products;

(b) the management of hazardous waste that is generated; and

(c) regulation of the waste management and brokerage industries.

2.1 International - Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal is a global environmental agreement on hazardous and other wastes. The Basel Convention entered into force in May 1992. Its main principles are to:

- reduce and minimise the generation of hazardous waste;
- reduce transboundary movements of hazardous wastes to a minimum consistent with environmentally sound management; and
- treat and dispose of hazardous wastes as close as possible to their source of generation.

Ireland is a Party to the Basel Convention which entered into force for Ireland in 1994. In 1995, Decision III/1 (the export ban amendment) was adopted prohibiting transboundary movements of hazardous wastes from Parties listed in Annex VII of the Basel Convention to all other countries (Annex VII includes all OECD member countries, the EU and Liechtenstein). To date the export ban amendment has yet to enter into force due to the insufficient number of ratifications. However, it has been transposed by a number of OECD countries (the EU Member States) into their national legislation.

Regulation (EC) No. 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste (also referred to as the Transfrontier Shipment (TFS) Regulation) and its amendments address the requirements of the Basel Convention on transboundary movement of wastes. In Ireland the Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) and amendments address the administrative provisions to implement the EU TFS Regulation. All transfrontier shipments of hazardous waste originating in any local authority area in the State that are subject to the prior written notification procedures must be notified to and through Dublin City Council at the National TFS Office, which was established to implement and enforce the 2007 Regulations.

13 European legislation can be downloaded at *http://eur-lex.europa.eu*
14 Irish legislation is available at *www.irishstatutebook.ie*.

2.2 EU legislation on hazardous waste

2.2.1 EU Waste Framework Directive

Waste management at EU level is regulated by the Waste Framework Directive (2008/98/EC)[15]. The Directive lays down measures to protect the environment and human health by preventing or reducing the adverse impacts due to the generation and management of waste. This revised Directive streamlines EU waste legislation by replacing three existing directives: the previous Waste Framework Directive 75/442/EC, the Hazardous Waste Directive 91/689/EC and the Waste Oils Directive 75/439/EC.

The Directive updates the waste hierarchy, outlining the following in order of priority:

- Prevention – including reducing hazardous materials content in products;
- Preparing for re-use;
- Recycling;
- Other recovery, e.g. energy recovery; and
- Disposal.

In its previous form, the Waste Framework Directive required Member States to take steps to encourage waste prevention. The revised Directive outlines an updated hierarchy which should act as a priority order and reinforces waste prevention at the top of the hierarchy. When applying the waste hierarchy, Member States have to take measures to encourage the options that deliver the best overall environmental outcome.

In relation to hazardous waste, requirements under the Directive include the establishment, revision and reviewing of hazardous waste management plans, inspections of hazardous waste facilities, record keeping, hazardous waste classification, banning of the mixing of hazardous waste, packaging and labelling requirements.

Other key issues of relevance addressed in the revised Directive include:

- *Extended producer responsibility* - Member States have powers to introduce new producer responsibility measures to increase levels of recycling, re-use and waste prevention;
- *Waste prevention plans* - Waste prevention plans are required to be drawn up by 12 December 2013;
- *Energy recovery* - energy-efficient incineration facilities dedicated to the processing of municipal solid waste will be able to be classed as "recovery" rather than "disposal" operations, moving them up the waste hierarchy;
- *End of waste criteria* - by which a material which is recovered or recycled from waste can be deemed to be no longer a waste;
- *By-products* - the Directive provides clearer distinction between by-products and waste and sets out conditions to be met for which material can be deemed to be a by-product.

15 Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives

2.2.2 Other relevant EU legislation

The following EU Directives and Regulations are of relevance to the National Hazardous Waste Management Plan and in the prevention (principally by restriction of hazardous substances) and management of hazardous waste generally:

- Industrial Emissions Directive[16] - which sets out the licensing procedures and criteria for certain industrial activities. Licences make specific provision for the prevention of waste and for its proper management. The Directive revises and merges seven separate existing Directives related to industrial emissions into a single Directive, including the Integrated Pollution Prevention and Control (IPPC) Directive (2008/1/EC), Volatile Organic Compounds (VOC) Solvents Directive (99/13/EC), Waste Incineration Directive (2000/76/EC), Large Combustion Plants (LCP) Directive (2001/80/EC) and Titanium Dioxide Directives (78/176/EEC, 82/883/EEC and 92/112/EEC) on waste from the titanium dioxide industry.
- Decorative Paints Directive[17] - which limits the solvent content of several classes of paint product. A scheme using Inspection Contractors is in place to monitor vehicle refinishing activities including disposal of VOC-containing wastes.
- The PCB (polychlorinated biphenyls) Directive[18] - requiring the disposal of PCBs and the environmentally sound decontamination or disposal of PCB-containing equipment.
- The WEEE (Waste Electrical and Electronic Equipment) Directive[19] - imposing a producer responsibility obligation in respect of WEEE management, several categories of which are classified as hazardous waste.
- The RoHS (Restriction of Hazardous Substances) Directive[20] - restricting the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) in new electrical and electronic equipment.
- The Classification, Labelling and Packaging of Substances and Mixtures Regulation[21] - which uses internationally agreed classification criteria and labelling elements in order to facilitate trade and to contribute towards global efforts to protect humans and the environment from hazardous effects of chemicals.
- The End-of-Life Vehicles Directive[22] - obligations with regard to the restriction of use of certain hazardous substances in vehicles and the collection, treatment, re-use and recovery of end-of-life vehicles.

16 Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions
17 Directive 2004/42/CE of the European Parliament and of the Council of 21 April 2004 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products and amending Directive 1999/13/EC
18 Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT)
19 Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE)
20 Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast)
21 Regulation (EC) No. 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures
22 Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles

- The Batteries Directive[23] - obligations with regard to the restriction of use of certain hazardous substances in batteries and accumulators, collection, treatment and recycling of batteries.
- The Packaging Directive[24] - restricts the aggregate concentration of heavy metals (lead, cadmium, mercury and hexavalent chromium) in packaging. Packaging essential requirements are set out such that packaging is so manufactured that the presence of noxious and other hazardous substances and materials as constituents of the packaging material or of any of the packaging components is minimised with regard to their presence in emissions, ash or leachate when packaging or packaging residues from management operations or packaging waste are incinerated or landfilled.
- The Transfrontier Shipment of Waste Regulation[25] - as discussed above - imposes controls on the import, export and transit of waste, including hazardous waste.
- The Animal Remedies Directive[26] - putting in place appropriate collection systems for veterinary medicinal products that are unused or expired.
- The Registration, Evaluation, Authorisation and Restriction of Chemicals (REACh) Regulation[27] - applies to the identification of the properties of chemicals, the provision of safety information and calls for progressive substitution of dangerous chemicals as suitable alternatives are identified.
- The Port Reception Facilities Directive[28] - applies to all ships, including fishing vessels and recreational craft, and aims to reduce the discharge of ship-generated waste and cargo residues into the sea by improving the availability and use of port reception facilities.
- The Ozone Depleting Substances Regulation[29] - prohibits and restricts the use of "controlled substances" that have the potential to deplete the ozone layer, including *inter alia* chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), halons, methyl bromide and carbon tetrachloride.
- The Fluorinated Greenhouse Gas Regulation[30] - regulates the containment and handling of fluorinated greenhouse gases (f-gases), such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride. The European Commission published a proposal for a revised F-gas Regulation in November 2012, with the view to phasing down the supply of bulk HFCs, and introducing additional prohibitions on certain products and equipment.

23 Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC

24 European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste

25 Regulation (EC) No. 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste

26 Directive 2001/82/EC of the European Parliament and of the Council of 6 November 2001 on the Community code relating to veterinary medicinal products

27 Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No. 793/93 and Commission Regulation (EC) No. 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC. Regulation (EC) No. 552/2009 of 22 June 2009 amending Regulation (EC) No. 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as regards Annex XVII

28 Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues

29 Regulation (EC) No. 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer (Regulation (EC) No. 2037/2000 was repealed)

30 Regulation (EC) No. 842/2006 of the European Parliament and of the Council of 17 May 2006 on certain fluorinated greenhouse gases

There is an increased focus in the proposed revision on global warming potential (GWP), with more onerous controls proposed for those f-gases with high GWP. This regulation[31] is now published and will apply from 1 January 2015.

- The Persistent Organic Pollutants (POPs) Regulation[32] - sets out the requirements for the prohibition, management, monitoring and control of persistent organic pollutants including persistent organic pollutants in wastes.
- Pollutant Release and Transfer Register (PRTR) Regulation[33] - sets out the requirements for a European Pollutant Release and Transfer Register.
- Mercury Export Ban & Storage Regulation[34] - sets out the requirement concerning the banning of exports of metallic mercury and certain mercury compounds and mixtures and the safe storage of metallic mercury.
- Extractive Industries Waste Directive[35] concerns the management of waste from the extractive industries.
- The EU Animal By-Products Regulations (Regulation (EC) No. 1069/2009 & Commission Regulation (EC) No. 142/2011) lay down the rules concerning animal by-products including disposal requirements.
- Sustainable Use of Pesticides Directive[36] - concerns closer monitoring, increased training and information for users as well as specific measures for the use of these substances.

2.3 National legislation for hazardous waste

The Waste Management Act 1996 as amended provides the legislative framework for waste and hazardous waste management in Ireland. The transposition of EU waste directives is enacted for the most part through enabling provisions included within the Act. The Environmental Protection Agency Act 1992 provides the framework for several other EPA functions, including the issuing of licences for certain industrial activities.

The following regulations contribute to the governance of the production and management of hazardous waste:

- European Communities (Waste Directive) Regulations, S.I. No. 126 of 2011 - transpose Directive 2008/98/EC on waste. These Regulations also formalise the concepts of "by-product" and "end-of-waste" in Irish law. Waste Transfer Station (WTS) operators who send materials off-site as non-waste must ensure that the requirements of Regulations 27 and/or 28 are met.

31 Regulation (EU) No. 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006

32 Regulation (EC) No. 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC

33 Regulation (EC) No. 166/2006 of the European Parliament and of the Council of 18 January 2006 concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC

34 Regulation (EC) No. 1102/2008 of the European Parliament and of the Council of 22 October 2008 on the banning of exports of metallic mercury and certain mercury compounds and mixtures and the safe storage of metallic mercury

35 Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries and amending Directive 2004/35/EC

36 Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides

- Waste Management (Hazardous Waste) Regulations, S.I. No. 163 of 1998 - make certain provisions including for the supply of batteries, the reporting of certain PCB-contaminated equipment and the management and disposal of polychlorinated biphenyls (PCBs) and PCB-containing wastes and waste asbestos.

- European Union (Industrial Emissions) Regulations, S.I. No. 138 of 2013, Environmental Protection Agency (Industrial Emissions) (Licensing) Regulations, S.I. No. 137 of 2013, European Union (Waste Incineration Plants & Waste Co-incineration Plants) Regulations, S.I. No. 148 of 2013, European Union (Large Combustion Plants) Regulations, S.I. No. 566 of 2012, European Union (Installations and Activities using Organic Solvents) Regulations, S.I. No. 565 of 2012 - provide for the issuing and enforcement of licences by the EPA for Industrial Emission Directive activities.

- Waste Management (Licensing) Regulations, S.I. No. 395 of 2004 - provide for the issuing and enforcement of waste licences by the EPA.

- European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations, S.I. No. 324 of 2011 - The control of hazardous waste shipments is now fully consolidated under the National Transfrontier Shipment Office. Exports of waste from the State have been centrally controlled by the National Transfrontier Shipment Office since 1 July 2007 and a new electronic tracking system introduced on 1 January 2012 ensures that all hazardous waste movements within the State are also brought under one national authority, thus further consolidating and strengthening controls on such waste movements, while also delivering administrative efficiencies. The above regulations also revoke Parts V and VI of the Waste Management (Hazardous Waste) Regulations, S.I. No. 163 of 1998.

- Waste Management (Shipments of Waste) Regulations, S.I. No. 419 of 2007 - streamline the administration of Regulation (EC) No. 1013/2006 on the shipment of waste and nominate Dublin City Council as sole competent authority in respect of the export into, import from and transit of waste through Ireland.

- Waste Management (Registration of Brokers and Dealers) Regulations, S.I. No. 113 of 2008 - regulate waste contractors who arrange shipment of waste.

- Waste Management (Planning) Regulations, S.I. No. 137 of 1997 - provide for, in part, the relationship between the National Hazardous Waste Management Plans and local and regional waste management plans.

- Waste Management (Facility Permit and Registration) Regulations, S.I. No. 821 of 2007, Waste Management (Facility Permit and Registration) (Amendment) Regulations, S.I No. 86 of 2008 - provide for the issuing and enforcement of waste facility permits and certificates of registration for prescribed activities.

- Waste Management (Collection Permit) Regulations, S.I. No. 820 of 2007 - provide for the issuing and enforcement of waste collection permits. The National Waste Collection Permit Office (operated by Offaly County Council) has responsibility for the issuing of collection permits.

- European Union (Waste Electrical and Electronic Equipment) Regulations 2014, S.I. No. 149 of 2014 give effect to the provisions of Directive 2012/19/EU on waste electrical and electronic equipment. European Union (Restriction of Certain Hazardous Substances in Electrical and Electronic Equipment) Regulations, S.I. No. 513 of 2012, transpose the provisions of the RoHS Directive in Ireland.

- Waste Management (End of Life Vehicles) Regulations, S.I. No. 282 of 2006 - are designed to implement the provisions of the End of Life Vehicles Directive in Ireland.
- European Communities (Metallic Mercury Waste) Regulations, S.I. No 72 of 2013 - bring into force specific criteria for the storage of metallic mercury considered as waste.
- Control of Substances that Deplete the Ozone Layer Regulations, S.I. No. 465 of 2011 - make provisions for the full and effective implementation of Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer.
- Fluorinated Greenhouse Gas Regulations, S.I. No. 279 of 2011 - make provisions for the full and effective implementation of Regulation (EC) No. 842/2006 on certain fluorinated greenhouse gases.
- Environmental Protection Agency Act 1992 (Fluorinated Greenhouse Gas) Regulations, S.I. No. 278 of 2011 - designate the EPA as the competent authority for the implementation of Regulation (EC) No. 842/2006 on certain fluorinated greenhouse gases.
- European Union (Installations and Activities Using Organic Solvents) Regulations, S.I. No. 565 of 2012 & European Union (Paints, Varnishes, Vehicle Refinishing Products and Activities) Regulations, S.I. No. 564 of 2012 - govern installations and activities using organic solvents, such as vehicle refinishers and dry cleaners, for the purpose of preventing or limiting emissions of volatile organic compounds.
- The Waste Management (Packaging) Regulations, S.I. No. 798 of 2007 – give effect to the Packaging and Packaging Waste Directive.
- European Communities (Animal Remedies) (No. 2) Regulations, S.I. No. 786 of 2007 – set out obligations concerning unused or expired animal remedies.
- Animal Remedies Regulations, S.I. No. 734 of 2005 - a registered veterinary practitioner or pharmacist is required to have in place a system whereby farmers can return an animal remedy that is unused or expired. They are also obliged to make farmers aware of these return arrangements.
- European Communities (Port Reception Facilities for Ship-generated Waste and Cargo Residues) Regulations, S.I. No. 117 of 2003 - oblige harbour masters and port authorities to prepare waste management plans for the management of ship-generated waste and cargo residues at Irish ports and harbours.
- Waste Management (Batteries and Accumulators) Regulations, S.I. No. 268 of 2008 – implement the Batteries Directive in Ireland. The European Union (Batteries and Accumulators) (Amendment) Regulations, S.I. No. 529 of 2012 amend the Waste Management (Batteries and Accumulators) Regulations 2008 as amended and are intended to give effect to Commission Decision 2009/603/EC establishing requirements for registration of producers of batteries and accumulators in accordance with Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators.
- Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations, S.I. No. 524 of 2008 - provide primarily for the certification of historic unlicensed local authority waste disposal sites in operation between 1977 and 1996.

- Waste Management (Management of Waste from the Extractive Industries) Regulations, S.I. No. 566 of 2009 - provide for measures on the management of waste from the extractive industries.
- Persistent Organic Pollutants Regulations, S.I. No. 235 of 2010 – give effect to the EU POPs Regulation in Ireland designating the EPA as the competent authority for their implementation and also outlining the roles of other public bodies concerned.
- European Communities (Sustainable Use of Pesticides) Regulations, S.I. No. 155 of 2012 – give effect to the Directive concerning measures to achieve the sustainable use of pesticides.
- European Communities (Transmissible Spongiform Encephalopathies and Animal By-Products) Regulations, S.I. No. 252 of 2008, as amended, and the Diseases of Animals Act 1966 (Transmissible Spongiform Encephalopathies) (Fertilizers and Soil Improvers) Order 2008, S. I. No. 253 of 2008 – give further effect to the EU Animal By-Products Regulations.
- Regulation of Retail Pharmacy Businesses Regulations, S.I. No. 488 of 2008 – a pharmacy may accept return medicines for proper disposal.

2.4 Classification of hazardous waste

Waste producers are required to classify their waste as either hazardous or non-hazardous. On completion of the classification, the correct European Waste Catalogue (EWC) code must be assigned from the List of Waste (LoW)[37] (waste marked with an asterisk (*) is considered as a hazardous waste, pursuant to the relevant legislation). Assessing waste as hazardous or non-hazardous is a multi-stage process, and the EPA has developed a paper tool[38] (updated in 2012) for the identification of the hazardous components of waste. This provides producers of waste with a procedure, based on up-to-date standards and information, for the identification and categorisation of the hazardous components of waste.

The LoW provides a harmonised, non-exhaustive waste list and it is divided into 20 chapters which must be used in order of precedence. The LoW codes reflect either the origin of the waste from a particular sector or the type of waste. A waste producer may classify its activities in several chapters of the catalogue. For instance, a car manufacturer may find its wastes listed in chapters 12 (wastes from shaping and surface treatment of metals), 11 (inorganic wastes containing metals from metal treatment and the coating of metals) and 8 (wastes from the use of coatings), depending on the different process steps.

Within the LoW, waste can be categorised into the following:

- hazardous, known as “absolute” hazardous entries
- non-hazardous, known as “absolute” non-hazardous entries, and
- wastes that may be hazardous or non-hazardous, known as “mirror” hazardous and “mirror” non-hazardous entries.

The “mirror entries” on the LoW allow for certain wastes to be classified as hazardous or non-hazardous waste depending on the presence of dangerous substances at certain concentrations. The following example illustrates how mirror entries are presented:

37 European Waste Catalogue and Hazardous Waste List – Valid from 1 January 2002, EPA, 2002
38 Available for download at http://www.epa.ie/waste/hazardous/class

17 05 03*	soil and stones containing dangerous substances
17 05 04	soil and stones other than those mentioned in 17 05 03

The presence of dangerous substances in a waste could imply a hazardous waste classification. The waste producer may look to demonstrate through compositional analysis that the substances are present in concentrations not exceeding prescribed threshold values. The results of the compositional testing must be populated into the amended paper tool on the identification of the hazardous components of waste.

Currently, a review of the LoW and of the hazardous properties is being carried out by the European Commission which will lead to amendments to the catalogue.

2.5 Emerging issues and recommendations for future consideration

There are a number of changes that will take effect within the revised Plan period as a result of recent or expected legislative amendments, in addition to some areas that may have implications for hazardous waste management, some of which are described below:

2.5.1 Replacement of Regional Waste Management Plans

The Government's new waste policy, *A Resource Opportunity – Waste Management Policy in Ireland*, which was published in July 2012, provides for a reduction in the number of existing waste management regions from ten to no more than three. The development of waste management plans and the formation of regions for such purposes remains a matter for local authorities under Part II of the Waste Management Act as amended.

The local authorities have now formed three non-hazardous waste management planning regions – the Connacht-Ulster Region (lead authority Mayo County Council), the Eastern-Midland Region (lead authority Dublin City Council) and the Southern Region (lead authority a consortium of Limerick County Council and Tipperary County Council). The National Coordination Committee on Replacement Waste Management Plans has been established and the local authorities are now beginning the process of development of replacement Plans. In the meantime, the existing plans will remain applicable until the new plans have been put in place.

2.5.2 Enforcement

National Waste Policy[39] indicated that a review of the respective waste regulation and enforcement roles of the EPA and local authorities will be completed by the end of 2013. This was to have a particular focus on dealing with serious criminal offenders and the need for more intelligence-led and coordinated multi-agency enforcement, aimed at ensuring targeted, timely and effective enforcement outcomes. This review is at an advanced stage at the time of writing (refer also to Section 3.7 for further information).

39 A Resource Opportunity - Waste Management Policy in Ireland - Department of the Environment, Community and Local Government, July 2012

2.5.3 Waste Electrical and Electronic Equipment (WEEE)

The recast of the Waste Electrical and Electronic Equipment (WEEE) Directive was published in July 2012[40]. Some of the more challenging aspects of the recast are the collection targets, set at 45% in 2016 and 65%[41] from 2019, based on the average weight of electrical and electronic equipment placed on the market in the previous 3 years.

The recast of the WEEE Directive also obliges Member States to prioritise preparation for re-use at the earliest stages of WEEE take-back, separate WEEE for re-use and enable access to refurbishment centres. The transposition of the WEEE recast should assist in creating the correct regulatory environment to support the development of re-use in Ireland. Transposed national regulations[42] came into effect in March 2014.

2.5.4 End of Life Vehicles

The End of Life Vehicles (ELV) Directive targets are in place since January 2006, and higher targets will come into effect from January 2015. Ireland is failing to meet the ELV Directive targets which have been effective since January 2006. Preliminary data for 2011 indicate that a re-use/recovery rate of 79% and a reuse/recycling rate of 77% were achieved against targets of 85% and 80% respectively.

The Department of the Environment, Community and Local Government (DECLG) is currently considering a number of measures aimed to address difficulties concerning ELVs and new regulatory structures are expected to be in place by 2015.

2.5.5 Ozone Depleting Substances / Fluorinated Greenhouse Gases

While the use of virgin HCFC (e.g. R22) in the maintenance of refrigeration and air conditioning equipment has been prohibited since 1 January 2010, the use of recycled and reclaimed R22 can continue until 31 December 2014. In 2012/2013, the EPA commissioned a study into the nature and extent of remaining R22 installed in Ireland, through a stakeholder survey and consultation exercise. The findings from the study indicated that awareness of the forthcoming final phase out of R22 was variable across and within sectors. A proposed awareness plan was developed as part of the study and elements of this plan will be implemented by the EPA, as resources allow.

In addition to the approaching deadline for HCFCs, the deadline for the use of halon in certain critical use applications is also approaching. Airports and airfields have availed of a critical use exemption under the ODS regulation (EU Regulation (EC) No. 1005/2009 as amended) for the use of halon in crash rescue vehicles and in hangars and maintenance areas. This critical use application will cease on 31 December 2016. All airports in Ireland have been formally informed by the EPA of the approaching deadline.

As the deadlines for the prohibition of HCFCs and halons approach and pass, the quantities of waste HCFC gas and waste halons requiring management, both of which are designated as hazardous waste, are expected to increase.

40 Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment

41 Member States can choose an alternative target of 85% of WEEE generated.

42 European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)

A dedicated webpage has been created on the EPA website to provide stakeholders with information on the approaching phase-out, and final prohibition dates can be found at:

http://www.epa.ie/air/airenforcement/ozone/r22andhaloncriticalusephase-out

2.5.6 Green Public Procurement

The 2012 DECLG publications, *Green Tenders - An Action Plan on Green Procurement* and *Our Sustainable Future - A Framework for Sustainable Development for Ireland*, establish the clear vision and place of Green Public Procurement (GPP) in future national governance arrangements. Given the scale of public procurement across all Irish Government Departments and Agencies, GPP is recognised as an important policy instrument in promoting the development and expansion of markets for green products and services. This can be achieved by including green criteria into procurement procedures by which contracting authorities can support and promote greener production processes, greener products and greener services. GPP is a core strand of driving sustainability, promoting resource efficiency, and progressing circular economy ambitions.

The GPP Action Plan Implementation Group comprising Governmental bodies and agencies has been tasked with drawing up terms of reference for further ongoing research into GPP methodologies, target-setting and effective implementation, evaluation and monitoring. The Office of Public Works (OPW) at the time of writing is developing specific GPP guidance relating to the construction sector in particular.

The EPA is currently developing guidance on specifying "green" credentials in procurement and reviewing tenders with such commitments. Following public tender and award in 2013, the project to develop this guidance has recently commenced and the overall expected project outcome will be a practical guidance document to assist the wider public sector to include green criteria into tendering procedures as a sustainable means of procuring goods and services.

2.5.7 Minamata Convention on Mercury

Mercury is a global pollutant that can cross international borders through long-range transport in the atmosphere and is highly toxic to humans, ecosystems and wildlife.

To address this issue, the UNEP Governing Council in 2009 agreed to take international action on mercury through the elaboration of a legally binding instrument to reduce risks to human health and the environment posed by mercury.

In January 2013, governments agreed on a new global legally binding multilateral environmental agreement to address all aspects of the mercury life-cycle, including wastes, storage and emissions. The text to the Convention has been adopted (October 2013). The Convention is expected to enter into force 90 days after the deposit of the fiftieth instrument of ratification, expected to be in 2017 or 2018. This new multilateral environmental agreement is called the "Minamata Convention on Mercury".

2.5.8 Unconventional Gas Exploration and Extraction

Unconventional Gas Exploration and Extraction (UGEE) is an emerging issue in Ireland, in particular with regard to the use of hydraulic fracturing ("fracking") technology. At present there is no UGEE project/operation underway that has reached either the exploratory or commercial drilling stage.

The EPA is commissioning a 24-month programme of research (commencing in 2014) on UGEE in collaboration with the Department of Communications, Energy and Natural Resources (DCENR) and the Northern Ireland Environment Agency, with the principal aim of furthering the understanding of the potential impacts on the environment and human health from UGEE projects/operations. This research will also consider waste aspects associated with UGEE. The EPA along with other authorities such as the Commission for Energy Regulation, DCENR and local authorities will have roles in regulating any UGEE projects/operations, should such activity commence after the completion of the research programme.

2.5.9 Recommended changes

Similar to the previous plan, it is recommended that the need for a consolidated set of regulations be kept under review to consolidate certain provisions of existing regulations and to provide for new obligations. Any new regulations should at least replace the articles of the existing Waste Management (Hazardous Waste) Regulations (S.I. No. 163 of 1998) that remain relevant. The following should also be considered:

- At present, the transport of very small quantities of hazardous waste must be covered by a collection permit and this creates barriers to the commercial collection of certain very small hazardous waste streams (e.g. home-administered medical waste). The collection permit system should provide for a reasonable and proportional level of regulation for essential and approved small-scale services, consistent with the provisions of Article 24 of the Waste Framework Directive.
- With requirements under waste legislation to hold a waste licence for the storage of waste pending onward treatment, certain outlets (such as veterinary practices/pharmacies) may be reluctant to take back certain wastes from customers under take-back schemes. To encourage take-back of hazardous wastes from certain sources, it is recommended that a review of waste licensing legislation be carried out to establish an appropriate and proportionate regulatory mechanism, or relief, to facilitate the take-back of certain hazardous wastes from smaller sources (e.g. unused or expired animal remedies and human medicines).
- In relation to the management of farm hazardous waste, the current farm plastic recovery and recycling scheme operated by Irish Farm Films Producers Group Ltd (IFFPG) should be examined and utilised to provide a mechanism whereby farmers can bring their hazardous wastes to these national bring centres for management and disposal. IFFPG is currently the sole approved body for the purpose of operating a compliance scheme for the recovery of farm plastic waste[43]. IFFPG collects both at the farmyard and at over 200 bring-centres across the country. To provide for a more holistic approach to farm waste management, IFFPG in association with agri-supply and farming sectors in 2010 established Farm Plastics Recycling Ltd to provide a service to farmers to recycle fertiliser bags, seed bags, netting and twine and empty pesticide containers. Options, such as the successful farm plastics recovery scheme operated by IFFPG and relevant legislation, should be evaluated in order to examine the feasibility of enabling farmers who use the bring-centres to bring other hazardous and non-hazardous farm wastes such as waste oils, paints and batteries for

43 Farm plastics are defined as sheeting, bale wrap or bale bags which are suitable for use for the conservation of fodder.

disposal/recovery. This is also relevant to the Producer Responsibility Initiative (PRI) Review currently being undertaken by the DECLG which is examining the feasibility of additional PRI schemes for a number of wastes including certain hazardous waste streams. The outcome of the 2013 farm hazardous waste collection pilot research initiative should also inform any future long-term action in this area[44].

44 Interim report available at *http://www.epa.ie/pubs/reports/waste/haz/pilotfarmhazardouswastebringcentresin2013interimreport.html*

3. The national hazardous waste profile

Information on hazardous waste generation and management presented in this chapter is categorised as managed and generated hazardous waste (Sections 3.1 & 3.2), unreported hazardous waste (Section 3.3) and contaminated soil (arising as a legacy waste, Section 3.4). The source of all data presented in this chapter is the EPA National Waste Report[45] series, unless otherwise indicated. Further information is also provided on extractive waste (Section 3.5) and radioactive waste (Section 3.6). Section 3.7 provides information on enforcement and some key challenges concerning hazardous waste.

3.1 Managed (reported) hazardous waste

A complete statistical dataset on reported hazardous waste management and generation has been prepared every year and biennially respectively by the EPA for the National Waste Report. Information on the management of hazardous waste in 2011 was mainly compiled from the National Waste Report, which in turn obtains relevant data as follows:

- Data on the import and export of hazardous waste for treatment as provided by the National Transfrontier Shipment Office (NTFSO), Dublin.
- Data on the treatment of hazardous waste off-site at commercial facilities in Ireland is also obtained by way of the hazardous waste treatment survey, which is sent to facilities that are licensed by the EPA or permitted by the local authorities to treat hazardous wastes.
- Data on the treatment of hazardous waste on-site at the industry where it was generated (which occurs under EPA licence at companies mainly in the pharmachem sector) were obtained from Pollutant Release and Transfer Registers (PRTR) and Annual Environmental Reports (AER).

There is a diverse range of hazardous wastes arising, each requiring different and often specialist treatment. For the purpose of guidance and awareness and continuous monitoring of hazardous waste management in Ireland, the EPA will prepare up-to-date factsheets on each of the main hazardous waste streams which will include information concerning the management of such waste streams. This will be carried out in the early part of the revised Plan period and made available on the EPA website (www.hazardouswaste.ie). The EPA will also prepare and make available key hazardous waste data indicators concerning the management of hazardous waste at regular intervals.

3.1.1 Management of hazardous waste

The largest quantity of hazardous waste is generated by Irish industry and includes such materials as industrial solvents, waste oils, industrial sludges and other chemical wastes. Households, small businesses, farms and the healthcare and construction sectors also generate quantities of hazardous waste including batteries, electrical equipment, healthcare risk waste, solvent-based paint and varnish waste, sheep dip and fluorescent lamps.

Table 6 provides some overall statistics in relation to the management of hazardous waste generated by Irish industry and society.

45 National Waste Reports for the years 1995, 1998 and 2001 to 2011 are available at *http://www.epa.ie/pubs/reports/waste/stats*

Table 6 Summary of hazardous waste management, 2006-2011 (excluding contaminated soil)

Category	2006	2007	2008	2009	2010	2011
[46]On-site at industry (t)	88,409	82,732	72,038	74,668	76,655	67,772
[47]Off-site in Ireland (t)	60,872	91,240	113,839	89,992	93,048	98,838
Exported (t)	134,904	147,542	157,207	150,395	143,180	149,037
[48]Total (t)	**284,184**	**304,941**	**319,098**	**289,910**	**287,874**	**287,376**

Source: National Waste Report 2011 (see current web version http://www.epa.ie/pubs/reports/waste/stats/)

The overall quantity of hazardous waste managed in Ireland in 2011 was 287,376 tonnes, a <1% reduction on that reported for 2009 (Table 6). To put this in context each year in the EU, 2.7 billion tonnes of waste are produced, of which 98 million tonnes is hazardous[49].

In 2011, 67,772 tonnes of hazardous waste was treated *on-site of generation* at IPPC-licensed facilities with 98,838 tonnes treated *off-site in Ireland* by a network of authorised hazardous waste treatment facilities. In the same year, 149,037 tonnes of hazardous waste was *exported* for treatment and disposal abroad, mostly for thermal treatment (incineration and use as fuel), but also for metal recovery, solvent recovery and landfill.

Figure 4 illustrates the long-term trend in the location of treatment of hazardous waste. In recent years it shows that the *on-site* treatment of hazardous waste decreased from 2010 to 2011. The *off-site* treatment of hazardous waste in Ireland has steadily increased over the years, although it is down from a peak in 2008. The *export* of hazardous waste has become the established outlet for roughly half of all Irish hazardous waste, although volumes have declined since a peak in 2008.

46 "On-site at industry" refers to hazardous waste recovered or disposed on-site at the industrial facility where it was generated, under an EPA licence.

47 "Off-site in Ireland" refers to waste sent to EPA licensed commercial hazardous waste treatment facilities for recovery or disposal.

48 In 2011 a reported 28,270 t of hazardous waste was blended at facilities in Ireland prior to export as a waste for further treatment (27,058 t reported as exported for use as fuel in cement kilns, a further 1,212 t hazardous waste was blended prior to export for incineration abroad). These quantities are correctly counted in both the treated "off-site in Ireland" row and the "exported" row. However, they have been discounted in the total row to avoid double counting in the total amount of hazardous waste managed. Similar discounting also took place in the "total" figures relating to 2007, 2008, 2009 and 2010 to avoid double counting in the total amount of hazardous waste managed.

49 Source: European Commission COM(2012) 710 final "Living well within the limits of our planet" - Proposal for a general Union Environment Action Programme

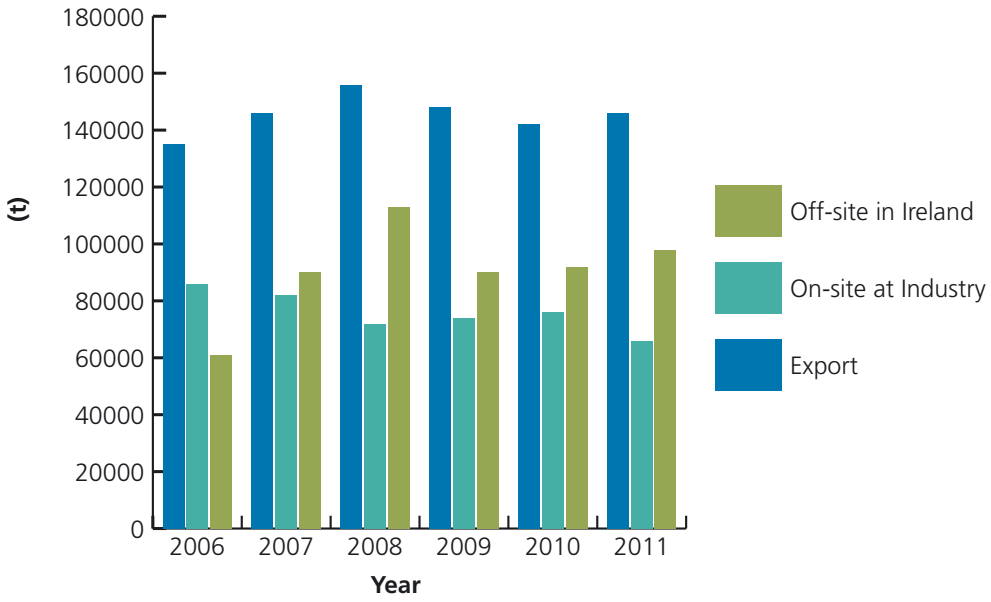

Figure 4 Trends in the location of hazardous waste treatment, 2006-2011

Figure 5 illustrates the trend between 2006 and 2011 in the recovery and disposal of hazardous waste generated in Ireland. While there has been a reduction in both recovery and disposal of hazardous waste on-site at industry, the overall trend shows a move towards waste recovery, with significant increases in the quantity of hazardous waste sent for recovery both off-site in Ireland and abroad. In general terms there has been an overall decline in the quantity of waste sent for disposal.

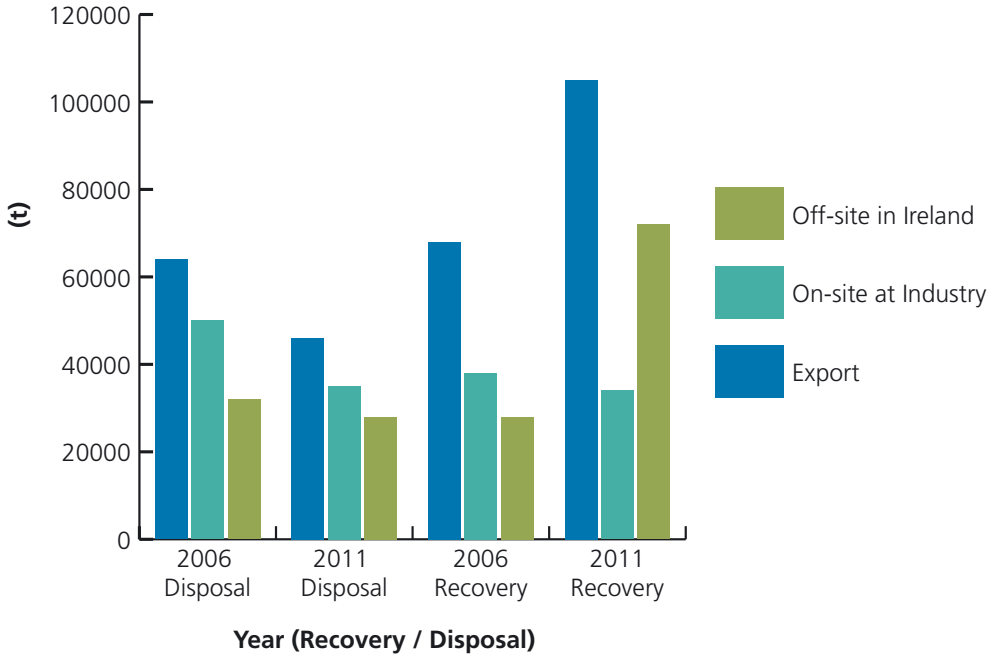

Figure 5 Trends in the recovery and disposal of hazardous waste treatment, 2006-2011

3.1.2 Hazardous waste treatment in Ireland

The reported quantity of hazardous waste treated in Ireland in 2011 was 166,610 tonnes (Table 7), which is an increase of 1% since 2009. Although there was a decrease in the treatment of hazardous waste on-site at industry in 2011 (decreased by 9% on 2009 tonnage to 67,772 tonnes), there was an increase in the treatment of hazardous waste off-site at commercial facilities in Ireland (increased by 10% on 2009 tonnage to 98,838 tonnes).

The increase in the treatment of hazardous waste off-site at commercial facilities in Ireland was largely attributable to an increase in the treatment of waste oils and solvents.

Table 7 Location of hazardous waste treatment in Ireland, 2011 (excluding contaminated soil)

Category	[50]On-site at industry (t)	[51]Off-site in Ireland (t)	Total (t)
Solvents	34,354	16,898	51,252
Solvents (halogenated, where specified)	6,176	631	6,807
Oil waste (mineral oil)	180	38,092	38,272
Industrial hazardous waste (other)	4,722	3,046	7,768
Salts and saltcake	20,079	4	20,083
Healthcare risk waste		9,036	9,036
Oily sludges	45	3,464	3,509
Equipment (electrical, electronic, mechanical)		7,404	7,404
Chemical waste (other)		120	120
Paint, ink and varnish waste (including packaging)		1,358	1,358
Acid and alkali waste		3,777	3,777
Aqueous washing liquids and mother liquors (07 __ 01*)	1,852	11,937	13,789
Solid wastes from MFSU of pharmaceuticals (07 05 13*)	295		295
Sludges and filter cakes	0.2	132	132
Packaging (contaminated or containing residues)	25	2,068	2,093
Photographic chemical waste		95	95
Metal- and heavy metal-containing waste		8	8
Absorbents, wiping cloths etc. (EWC 15 02 02)	30	2	32
Fluorescent lamps		260	260
Oil filters		7	7
Laboratory and general chemical waste	13	59	72
Thermal treatment and combustion residues		438	438
Municipal hazardous waste (other)		4	4
Totals	**67,772**	**98,838**	**166,610**

Source: 2011 National Waste Report (see current web version)

50 "On-site at industry" refers to hazardous waste recovered or disposed on-site at the industrial facility where it was generated, under EPA licence.

51 "Off-site in Ireland" refers to waste sent to EPA-licensed commercial hazardous waste treatment facilities in Ireland for recovery or disposal.

A wide range of techniques were used to treat hazardous waste in Ireland in 2011 (Table 8).

Table 8 Methods of treatment of hazardous waste in Ireland in 2011 (excluding contaminated soil)

Recovery / Disposal Code[52]	Disposal or recovery activity	On-site at industry (t)	Off-site in Ireland (t)	Total (t)
D1	Landfill	20,079		20,079
D8	Biological treatment	1,655		1,655
D9	Physico-chemical treatment	122	25,959	26,081
D10	Incineration	12,615		12,615
	Sub-total disposal	**34,471**	**25,959**	**60,430**
R1	Use as fuel	11,012		11,012
R2	Solvent recovery	21,770	27,978[53]	49,748
R3	Organic substance recovery	294	61	355
R4	Metal recovery		369	369
R3/R4	Combination of R3 and R4		1,522	1,522
R5	Inorganic substance recovery		5,842	5,842
R4/R5	Combination of R4 and R5		346	346
R9	Oil recovery	180	21,217	21,397
R4/R9	Combination of R4 and R9		1,562	1,562
R9/D9	Combination of R9 and D9		12,911	12,911
R10	Landspreading	45		45
D13/R12	Combination of D13 and R12		1,071[54]	1,071
	Sub-total recovery	**33,301**	**72,877**	**106,180**
	Total	**67,772**	**98,838**	**166,610**

Source: 2011 National Waste Report (see current web version)

In 2011, 20 IPPC-licensed facilities operated on-site treatment facilities treating 67,772 tonnes of hazardous waste (Table 9). EPA licensed operations are regulated and monitored by the EPA's Office of Environmental Enforcement in accordance with licence conditions. In the interest of reducing transport emissions and the export of hazardous waste, the promotion of on-site treatment of hazardous waste is recommended, primarily in the pharmachem sector, where this is technically and economically feasible and permissible by licence conditions.

52 See Appendix B for list of recovery and disposal operations.

53 This figure is made up of 26,895 t (solvent waste blended prior to its export as waste for use as fuel in cement kilns) plus a further 609 t of waste solvent which was recovered and sold as product. The remaining 474 t of hazardous wastes went abroad for incineration.

54 This 1,071 t represents the blending and storage of mixed solvents and aqueous liquids prior to their export for use as fuel as well as incineration.

Table 9 Treatment of hazardous waste on-site at IPPC-licensed facilities in 2011 (excluding contaminated soil)

Facility name	IPPC Reg. No.	Waste type	Recovery/ Disposal code	Quantity treated (t)
Arran Chemical Co Ltd	P0110-02	Solvents	R2	763
Astellas Ireland Co. Ltd	P0007-03	Solvents	D10	616
		Aqueous washing liquids and mother liquors (07__01*)	D10	1,400
Aughinish Alumina Ltd	P0035-04	Salts and salt cake	D1	20,079
BASF Ireland Ltd	P0052-02	Other industrial hazardous waste	R1	4,720
Phillips 66 Bantry Bay Terminals	P0419-01	Oil waste (mineral oil)	R9	180
Eli Lilly	P0009-03	Solvents	D10	2,944
		Solvents (Halogenated where specified)	D10	68
Galmoy Mines Ltd	P0517-01	Oily sludges	R10	45
Irish Industrial Explosives Ltd	P0055-01	Other industrial hazardous waste	D10	2
Mallinckrodt Medical Imaging Ireland	P0050-02	Solvents	R2	6,347
		Solvents	D8	306
		Solvents (Halogenated where specified)	D8	<0.1
		Solvents (Halogenated where specified)	D9	122
Merck Sharp & Dohme	P0011-04	Solvents	D8	1,061
			R2	1,820
Merck Millipore Ltd	P0571-02	Solvents	R2	1,380

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Facility name	IPPC Reg. No.	Waste type	Recovery/ Disposal code	Quantity treated (t)
Novartis Ringaskiddy Ltd	P0006-03	Other industrial hazardous waste	D10	<0.1
		Packaging (contaminates or containing residues)	D10	25
		Sludges and filter cakes	D10	0.2
		Solvents	D10	<0.1
			D8	284
			R1	1,756
			R2	4,102
		Absorbents, Wiping cloths	D10	30
		Aq. washing liquids and mother liquors (07__01*)	D10	452
		Solid wastes from MFSU of pharmaceuticals (07 05 13*)	D10	2
		Laboratory and general chemical waste	D10	13
Pfizer Ireland Pharmaceuticals	P0013-04	Solvents	R2	1,130
Pfizer Cork Ltd	P0136-04	Solvents	R2	2,724
		Solvents	R1	13
Roche Ireland Ltd	P0012-04	Solvents	R1	2,415
		Solvents (Halogenated where specified)	R1	958
Schering-Plough (Ireland)	P0015-05	Solvents	R1	1,151
Smithkline Beecham (Cork) Ltd	P0004-03	Solvents	D10	2,417
			R2	161
		Solvents (Halogenated where specified)	D10	8
Swords Laboratories	P0014-04	Solvents	D8	1.3
			R2	580
		Solvents (Halogenated where specified)	R2	224

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cont'd

Facility name	IPPC Reg. No.	Waste type	Recovery/ Disposal code	Quantity treated (t)
Bristol Myers Squibb Cruiserath	P0552-02	Solvents	R2	1,213
		Solvents (Halogenated where specified)	D10	4,639
			D8	2.5
			R2	154
Temmler Ireland Ltd	P0813-02	Solvents	R2	1,172
		Solid wastes from MFSU of pharmaceuticals (07 05 13*)	R3	294
Total:				**67,772**

Source: National Waste Report (see current web version)

3.1.3 Hazardous waste imported for treatment

In 2011 2,622 tonnes of oil-related waste was imported for recovery at commercial hazardous waste treatment facilities in the State (Table 10).

Table 10 Origin of hazardous wastes for recovery, 2011

Country of export	Waste description	Disposal or Recovery code[55]	Total imports (t)
UK (excluding Northern Ireland)	Waste oils/water, hydrocarbons/water mixtures, emulsions for composition.	R9	318
Northern Ireland	Waste oil	R9	1,096
	Waste oil-mineral bases, chlorinated hydraulic oils, mineral based chlorinated engine, gear and lubricating oils.	R9	1,208
Total			**2,622**

Source: National Waste Report (see current web version)

55 See Appendix B for a descriptive list of recovery and disposal operations.

3.1.4 Hazardous waste exported for treatment

Hazardous waste was mainly exported to a number of EU countries for treatment in 2011 (Figure 6). Four EU countries (United Kingdom, Belgium, Germany and France) accepted approximately 92% of these exports.

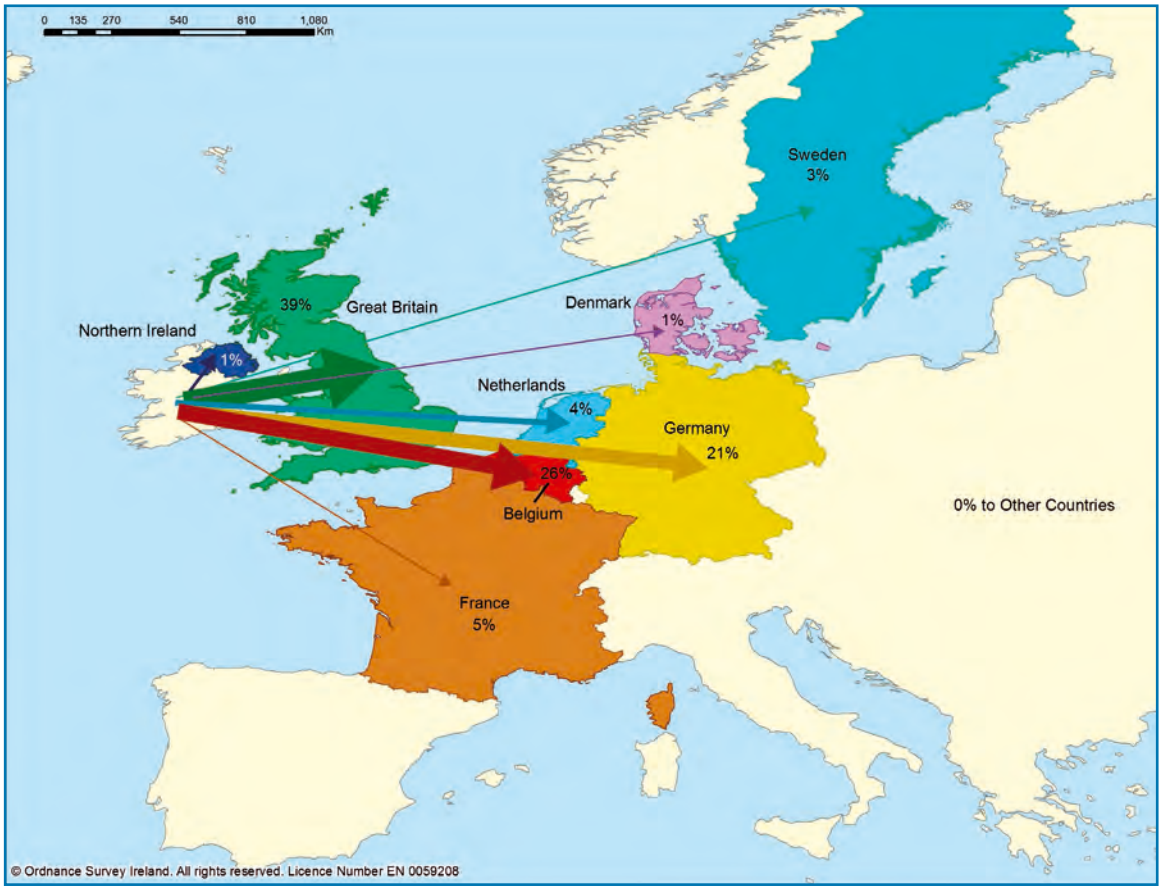

Figure 6 EU destination countries of exported hazardous waste, 2011

Exports amounted to 149,037 tonnes in 2011, consisting of a wide range of categories (Table 11). There continues to be an increase in the export of lead acid batteries, which increased by 4% in 2011 compared to 2010. Although the tonnage of other batteries (small, non-lead acid) exported has decreased when compared to 2010 levels, the overall tonnage of batteries exported has increased by 28% when compared to 2009 levels. This reflects the increased collection of batteries under the Waste Management (Batteries and Accumulators) Regulations (S.I. No. 268 of 2008), which came into effect in September 2008.

The quantity of WEEE exported increased by 108% in 2011 compared to 2009. A reported 28,270 tonnes of hazardous waste was blended at EPA licensed hazardous waste treatment facilities in Ireland in 2011, prior to being exported as a waste for use as fuel in cement kilns and incineration abroad. The quantity of solvents exported in 2011 increased by 2% compared to 2009.

Table 11 Categories of exported hazardous waste, 2007-2011 (reported from TFS data sets and categorised by EPA)

Category	Exported (t)				
	2007	2008	2009	2010	2011
Solvents	48,671	58,611	52,370	48,682	52,243
Solvents (halogenated, where specified)	6,743	8,693	4,540	1,893	6,079
Oil waste (mineral oil)	617	230	2,443	2,363	633
Industrial hazardous waste (other)	33,854	33,154	11,927	5,124	7,027
Healthcare risk waste	478	728	734	712	692
Oily sludges	7	107	94	45	30
Lead-acid batteries	10,565	11,050	11,832	14,805	15,374
Equipment (electrical, electronic, mechanical)	6,423	7,386	8,410	11,897	17,493
Chemical waste (other)	4,091	3,559	3,701	7,780	9,305
Paint, ink and varnish waste (including packaging)	2,805	4,843	4,834	5,459	4,713
Acid and alkali waste	2,384	2,917	2,578	1,556	1,558
Asbestos waste	6,168	7,007	14,068	9,512	7,001
Aqueous washing liquids and mother liquors (07 __ 01*)	10,747	5,278	10,647	12,637	9,616
Solid wastes from MFSU of pharmaceuticals (07 05 13*)	3,790	2,534	1,956	3,982	4,881
Sludges and filter cakes	5,036	6,057	3,834	3,663	3,006
Batteries (small, non-lead acid)	328	228	223	136	46[56]
Packaging (contaminated or containing residues)	785	746	664	867	777
Photographic chemical waste	680	650	432	221	284
Oil filters	640	1,092	741	739	654
Construction and demolition waste (hazardous)	82	137	12,892	9,137	3,236
Metal and heavy metal containing waste	42	71	69	181	83
Agricultural hazardous waste			72		
Absorbents, wiping cloths etc. (EWC 15 02 02*)	1,894	1,373	661	596	939

cont'd

56 This is a low volume compared to previous years however typically batteries are stockpiled prior to export. Approx. 600 tonnes of portables was collected by the compliance schemes during 2011.

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Category	Exported (t)				
	2007	2008	2009	2010	2011
Fluorescent lamps	116	56	74	58	119
Pesticides, herbicides	71	71	56	30	47
Laboratory and general chemical waste	332	193	485	548	677
Salts and saltcake				2	1
Thermal treatment and combustion residues	32	428	59	89	1,977
Medicines	1	3			
Municipal hazardous waste (other)	89			437	537
Polychlorinated biphenyls	71		1	29	8
Total	**147,542**	**157,202**	**150,397**	**143,179**	**149,037**

Source: National Waste Report 2011 (see current web version)

Approximately 68% of exported hazardous waste was recovered, with the balance being disposed (Table 12).

Table 12 Disposal and recovery of exported hazardous waste, 2011

Disposal (D) or recovery (R) code[57]	Exported (t)
D1	2,801
D1/D5	3,027
D10	35,569
D12	6
D14	24
D5	2,147
D8	1,999
D8/D9	527
D9	966
Sub-total hazardous waste exported for disposal	**47,065**
R1	28,182
R1, R3	60
R1, R3, R4	770

cont'd

57 See Appendix B for a descriptive list of recovery and disposal operations.

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Disposal (D) or recovery (R) code[57]	Exported (t)
R1, R3, R5	164
R1, R4	1,897
R1, R4, R5	283
R1, R5	23
R1, R9	25
R12	6,068
R13	2,191
R2	15,721
R2, R3	4,025
R3	3,651
R3, R4	4,482
R3, R5	54
R4	28,590
R4, R5	112
R5	4,426
R6	1,014
R8	1
R9	233
Sub-total hazardous waste exported for recovery	**101,972**
Total hazardous waste exported for treatment	**149,037**

Source: National Waste Report 2011 (see current web version)

Table 13 provides a further breakdown of the destination and fate of exported hazardous waste in 2011.

Table 13 Destination and treatment of hazardous waste exports, excluding contaminated soil, 2011

Destination	Disposal (t)	Recovery (t)	Total exports (t)
Belgium	11,475	26,937	38,412
Germany	21,261	9,747	31,008
Denmark	1,748		1,748
Finland	457		457
France	882	6,217	7,099
Italy		1	1
Netherlands	684	6,064	6,747
Poland		298	298
UK	10,560	48,771	59,330
USA		73	73
Sweden		3,865	3,865
Overall totals	**47,065**	**101,972**	**149,037**

Source: National Waste Report 2011 (see current web version)

3.2 Industrial hazardous waste generation

In terms of the manufacturing sector, generation of industrial hazardous waste is dominated by the "pharmaceutical and chemical" ("pharmachem") industry sector, with large contributions also from the manufacture of basic metals and metal products. Table 14 shows industrial hazardous waste generation by the manufacturing sector in 2010.

It should be noted that this dataset is presented here to illustrate and compare the estimated scale of hazardous waste generation by the manufacturing sectors only. Note that the methodology for the collection of 2010 waste generation data differed from previous years. Estimations are based on data provided in annual returns from EPA licensed operators, supplemented by a sample survey of a population of enterprises drawn from the business register by the Central Statistics Office (CSO). The figures are estimated using both data sources.

Table 14 Generation of hazardous waste by industrial manufacturing sectors, 2010

NACE Division[58]	NACE Sector	Total (t) of hazardous waste generated[59]
10_12	Manufacture of food products, beverages and tobacco products	1,381
13_15	Manufacture of textiles, wearing apparel and leather and related products	145
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	769
17_18	Manufacture of paper and paper products, printing and reproduction of recorded media	1,427
19	Manufacture of coke and refined petroleum products	698
20_22	Manufacture of coke and refined petroleum products, manufacture of basic pharmaceutical products and pharmaceutical preparations and manufacture of rubber and plastic products	189,342
23	Manufacture of other non-metallic mineral products	8,932
24_25	Manufacture of basic metals, manufacture of fabricated metal products, except machinery and equipment	92,054
26_30	Manufacture of computer, electronic and optical products, manufacture of electrical equipment, manufacture of machinery and equipment n.e.c., manufacture of motor vehicles, trailers and semi-trailers, manufacture of other transport equipment	17,756
31_33	Manufacture of furniture, other manufacturing, repair and installation of machinery and equipment	25,430
	Total	**337,934**

3.3 Unreported hazardous waste

By definition, the undocumented fate of unreported hazardous waste means that it has the potential to have a greater environmental impact than reported hazardous waste. By the same token, providing accurate estimates of unreported hazardous waste is very difficult. Some unreported waste may end up in general domestic or commercial waste, or it may be disposed of in an uncontrolled manner by burning, burying or discharge to sewer, water or surface ground.

Chapter 5 further details the issues around unreported waste and makes recommendations for improved collection of hazardous waste.

58 Note: a comprehensive review of the assignment of the different NACE Codes is due to be carried out in advance of the next reporting of waste generation figures.

59 Total estimated generation of hazardous waste within a sector, based on data reported by companies within that sector, scaled up on the basis of a factor describing hazardous waste generated per employee in the sector as a whole.

3.4 Contaminated soil

Table 15 outlines the trends in the management of contaminated soil and export between 2006 and 2011. This includes contaminated soil treated off-site in Ireland at commercial hazardous waste treatment facilities and contaminated soil that was exported for treatment. The data do not reflect any contaminated soil that was treated *in situ* at its point of generation. There was a 13% increase in the treatment of contaminated soil off-site in Ireland in 2011 compared with that in 2010. All reported off-site treatment in Ireland took place at Enva Ireland Ltd's Portlaoise facility (EPA Waste Licence Register No. W0184-01). All reported exports of contaminated soils in 2011 were to Germany, accounting for 59% of the total managed. There was an increase in the reported export of contaminated soil from 2,590 tonnes in 2010 to 10,203 tonnes in 2011; however, the overall tonnage of contaminated soil managed is still significantly down on pre-2009 data, reflecting the reduction in brownfield development/re-development projects during the economic downturn.

Table 15 Reported off-site management of contaminated soil, 2006-2011

	2006	2007	2008	2009	2010	2011
Off-site in Ireland (t)	**36,872(R)[60]**	**44,221(R)**	**2 (D) 43,531 (R)**	**12,428 (R)**	**6,260 (R)**	**7,094 (R)**
Exported (total) (t)	**370,032**	**143,906**	**449,574**	**476**	**2,590**	**10,203**
Germany	341,158 (D)	126,859 (D)	285,028 (D) 135,980 (R)	7 (D)	2,590 (D)	10,203 (D)
	28,570 (R)	14,919 (R)				
Netherlands	305 (R)	2,128 (R)	12,655 (D)	469 (R)		
			15,911 (R)			
Total reported (t)	**406,904**	**188,127**	**493,107**	**12,904**	**8,850**	**17,297**

Source: National Waste Report 2011 (see current web version)

3.5 Extractive waste

Extractive waste, also known as mining and quarry waste, is controlled under a specific EU Directive (2006/21/EC)[61]. The Extractive Waste Directive arranges for the management of such waste via a schema (e.g., for assessment, permitting, management, closure) separate to the EU Waste Framework Directive (98/2008/EC). However certain matters such as definition of hazardous waste are cross-referenced to the Waste Framework Directive, this latter Directive which sets out the authorities for the preparation of this Hazardous Waste Management Plan. Any operational extractive waste facility in the state that involves management (including disposal) of hazardous fractions of extractive waste is controlled by the EPA through the Industrial Emissions and Waste licensing systems and is therefore accommodated in the statistics presented herein. Such extractive waste management facilities are dedicated to the mineral

60 R is predominantly recovery or recycling; D is predominantly disposal.

61 http://ec.europa.eu/environment/waste/mining

processing site (and handle only extractive waste), i.e. the waste is not a burden on the national waste infrastructure - it is managed as a site-specific issue. Indeed, in recognition of this, the Extractive Waste Directive requires operators of such facilities to prepare dedicated waste management plans to include such matters as prevention, selection, design, operation, monitoring, public participation, closure & aftercare, and financial provision. There are no new mining activities currently in the national planning or EPA licence consent processes. Extractive waste from historical sites is described under Chapter 7.

3.6 Radioactive waste

Although it is strictly speaking outside the legally mandated scope of the National Hazardous Waste Management Plan[62], Appendix E provides information on the issue of radioactive waste. The Radiological Protection Institute of Ireland (RPII) has reiterated that there is a deficit in the provision of services to ensure the collection and management of radioactive waste. In particular the RPII identifies issues with legacy radioactive waste (sources that were in use since before the early 1990s and have now reached the end of their useful life). As detailed in Appendix E, substantial progress has been made in this area since the last Plan was published in 2008. In a report commissioned by the EPA under the previous National Hazardous Waste Management Plan in relation to aspects of a national Difficult Waste Facility (including hazardous waste), administrative and structural synergies were identified in the co-storage of this waste stream with certain hazardous waste streams[63].

3.7 Enforcement – some key challenges concerning hazardous waste

Environmental regulators in Ireland are responsible for in excess of 500 environmental protection functions contained within over 100 pieces of legislation. The EPA is responsible for regulating over 200 waste activities (e.g. landfills/waste transfer stations) and 500 industrial activities that have significant polluting potential. Local authorities control the collection and movement of waste in their functional areas and regulate smaller industrial waste and wastewater activities as well as controlling diffuse sources of pollution.

The Government's Waste Management Policy, *A Resource Opportunity*, contained a commitment to complete a review of the respective regulatory and enforcement roles of the Environmental Protection Agency and local authorities by the end of 2013. In early 2013, the DECLG established a group to carry out that review by examining current enforcement structures, identify the existing strengths and weaknesses and make recommendations for the future. The group comprises of representatives from local authorities, the regional waste management offices, the EPA, the National Transfrontier Shipment Office (NTFSO), the National Waste Collection Permit Office (NWCPO) and An Garda Síochána. The group has met on several occasions to date and a final outcome is expected in 2014.

In recent years there have been challenges for enforcement in the area of hazardous waste, some of which are highlighted below:

62 See section 3 of the Waste Management Acts 1996 as amended.

63 http://www.epa.ie/pubs/reports/waste/haz/nationaldifficultwastefacilitystudy.html

3.7.1 Waste oils

The unauthorised use of waste oil in burners for space heating is a problem which continues to exist. The burning of waste oil falls under the scope of the Industrial Emissions Directive (Directive 2010/75/EU). The operation of, for example, used oil burners, requires a licence from the EPA for Hazardous Waste Incineration. It is an offence to burn waste oil in the absence of a valid licence. The unauthorised combustion of waste oils in burners/energy units has the potential to cause harm to the environment and human health.

The EPA and local authorities have engaged in enforcement and awareness activities in this regard (e.g. targeted inspections and awareness via national and sector advertisements (e.g. car garages)). See EPA smart garage guide:
http://www.epa.ie/pubs/reports/waste/wpp/Smart%20Garage%20Guide%202010%20small.pdf))

Such enforcement and awareness activities should continue over the next revised Plan period.

The pork contamination incident in Ireland in 2008 also highlights the risk that PCB contaminated oil that is not managed properly can potentially pose to the environment and public health, as well as its economic impacts. Available evidence suggested that the incident occurred as a result of PCB contaminated fuel being used in an oil-fired burner used to dry animal feed.

3.7.2 Diesel fuel laundering

There has been a dramatic increase in recent times in diesel laundering waste dumping incidents. The scale of the dumping incidents can vary from one container to up to 45 intermediate bulk containers (IBCs)[64]. Laundering has been uncovered particularly in border counties such as Monaghan, Donegal and Louth, with laundered fuel seized in many areas, e.g. Galway, Athlone and Dublin.

Typically waste associated with these illegal activities, such as sulphuric acid wash, contaminated absorbent and bleaching earth sludge, has been exported to hazardous waste treatment facilities, at significant cost, in either Holland or Germany for treatment.

Local authorities have had to take measures to protect watercourses and to temporarily turn off public water supplies/monitor private wells due to dumping close to private dwellings. The waste is a significant health and safety risk because of its acidic nature. Also roads can be left in a very dangerous/slippery condition and must often be cleaned due to the risk of traffic accidents.

3.7.3 Waste Electrical and Electronic Equipment (WEEE) and Metal Theft

In line with a global trend, metal theft has become a problem in Ireland in recent years, due to increasing metal prices. Many economic sectors have experienced losses as a result of this trend and in some cases, such theft can lead to environmental pollution such as oil spillage, as well as health and safety concerns in the case of electrical cable and equipment.

64 Each IBC container can hold approximately 1,000 litres/1 tonne of waste.

The metal theft issue can only be tackled on a multi-stakeholder basis, and to this end, An Garda Síochána has established the Metal Theft Stakeholder Forum, which involves affected business and economic sectors as well as the EPA and local authorities. In February 2013, An Garda Síochána launched the Metal Theft Crime Prevention and Reduction Plan, which aims to deliver crime prevention and reduction policies/measures to combat the problem of metal theft.

WEEE has become part of the metal theft issue, due to the high metal content of large household appliances in particular. Automotive batteries are similarly attractive due to the high lead content. The high value of metal can be attractive to person(s)/groups seeking an alternative means of managing WEEE, other than via the established routes through the WEEE compliance schemes. These situations are referred to as WEEE leakage, where the WEEE is "leaking" from the established management routes. The WEEE compliance schemes participate in the Metal Theft Stakeholder Forum described above. The EPA is also working with An Garda Síochána to develop awareness material for parties concerned by metal theft/WEEE leakage issues.

3.7.4 End of life vehicles

Directive 2000/53/EC, the End of Life Vehicle (ELV) Directive, sets targets for re-use/recovery and re-use/recycling from January 2006, with higher targets coming into effect from January 2015. Ireland is currently failing to meet the ELV Directive targets which have been in place since January 2006. Preliminary data for 2011 indicate that a re-use/recovery rate of 79% and a re-use/recycling rate of 77% were achieved against targets of 85% and 80% respectively.

Urgent action is needed to increase re-use/recovery/recycling of ELV materials, and the DECLG will be engaging with producers and other stakeholders in this regard. The increases in the landfill levy and the removal of the exemption from the landfill levy for shredder residue are likely to encourage the recovery of shredder residue and therefore increase ELV recovery rates over time.

The EPA, working closely with local authorities, has prioritised the issue of unauthorised car scrapyards[65] during 2011/2012, resulting in the number of illegal sites falling from 157 to less than 10 in 2013 – a reduction of greater than 90%. A number of multi-agency actions took place during the period, often overcoming difficult operational obstacles.

65 This is an aspect of the 2005 ECJ waste case against Ireland and it is a national priority to have the illegal sites dealt with so that, among other reasons, legitimate operators are not undermined.

4. Prevention of hazardous waste

The data presented in Chapter 3 profile the generation and management of hazardous waste by Irish industry and society generally. As outlined in Chapter 1, there are challenges to be met in relation to this diverse hazardous waste stream: prevention, collection and self-sufficiency in treatment. This chapter outlines a programme for hazardous waste prevention that promotes the reduction in the generation of hazardous waste in targeted sectors of industry and society. These elements should be incorporated in the next National Waste Prevention Programme, which is being led by the EPA.

4.1 Definition of prevention

Prevention is at the top of the waste hierarchy, and represents the preferred policy approach to materials management and an alternative to the wastage of materials or resources. The prevention of waste is preferable to its generation and to the monetary and environmental costs incurred as a result of its generation. A new and revitalised approach to prevention is taken in the revised Waste Framework Directive.

"Prevention" means measures taken before a substance, material or product has become waste, that reduce:

a) the quantity of waste, including through the re-use of products or the extension of life span of products;

b) the adverse impacts of the generated waste on the environment and human health; or

c) the content of harmful substances in materials and products.

The revised definition clearly incorporates the principle of reducing the "hazardous properties" of waste (or qualitative prevention) as a means of preventing environmental pollution or damage to human health.

4.2 Approach to prevention

Effective waste prevention addresses the root causes and sources of waste, and is not typically concerned with waste management per se. Therefore, techniques for preventing waste should look at industrial processes, material inputs and products in a way that links them to wasted resources or inputs (i.e. waste). A problem for prevention is that any mention of the word "waste" causes people to immediately think about waste recycling and disposal, and not to consider the material and cost savings that can accrue from a real preventive approach to resource efficiency.

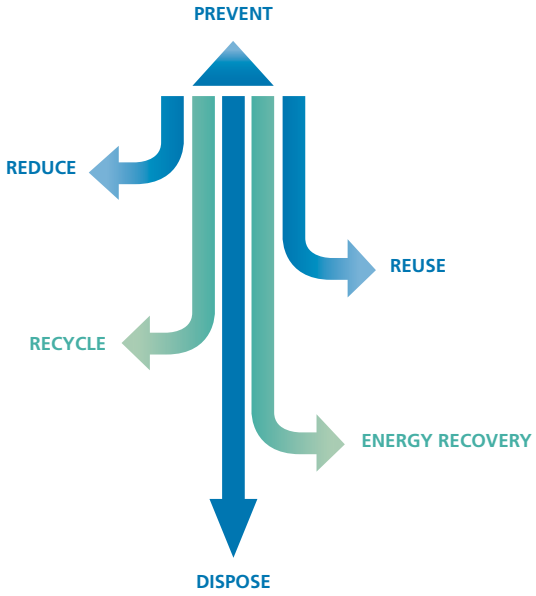

Figure 7 The waste hierarchy, highlighting prevention of waste as the preferred option

There are two dimensions to "prevention". The first is the avoidance of the generation of waste in the first place (e.g. by reducing material intensity). This, as noted above, is the purest form of prevention. The second is that if waste cannot be avoided, then prevention measures should ensure the elimination of harmful substances or compounds that present an environmental burden or interfere with the preparation for re-use and recycling of the waste. Application of eco-design across the entire life cycle of a product – from the extraction of raw materials to production, distribution and utilisation, all the way to re-use, recycling and disposal - can prevent or reduce hazardous waste arisings. As well as addressing issues of energy consumption and the responsible use of resources, eco-design needs to address user behaviour, product durability and reparability.

Prevention will continue to be a priority for the six year period of the revised Plan to progress the cultural change that makes businesses look again at resource efficiency in order to bring about a step change in the material intensity and hazardous properties of waste in Irish industry, and in society in general. Prioritised sectors will again be targeted in order to examine their material usage and waste generation profiles and to propose solutions. With expert knowledge, insights and technical and financial supports, industry can be encouraged to bring about the changes necessary to satisfy this paradigm for environmentally efficient industrial production.

The prevention of waste is always preferable to the generation of waste from two points of view. First, if a waste is not generated, it will have no opportunity to cause adverse human health or environmental impacts. Second, the holder of the waste does not have to pay for its management. The latter would appear to present a compelling case for businesses to prevent waste. However the slow adoption of preventive measures, even when their benefits are well proven and well known, demonstrates that achieving prevention is as much a socio-economic and psychological problem as a technical one. Consequently, if we really wish to promote and continue to achieve waste prevention, a mix of cumulative, integrated policy measures is required. This chapter sets out the continued approach to promoting and achieving the prevention of hazardous waste.

In considering the scope for prevention, the existing waste management status of a sector and the degree to which the sector itself can make changes that will achieve prevention are important. There is an "evolutionary pathway" whereby a sector may improve its waste management initially by achieving compliance and effectively segregating wastes, thereby minimising the quantity of hazardous waste generated for disposal. However, improvement may stop at this point and not progress further to embrace prevention (as opposed to recycling) unless there are external drivers for this continuous improvement. The proposed approach will encourage improved segregation by generators of hazardous waste, allow them to identify the scale and origins of individual waste streams, and draw their attention to the more significant elements of their wastage where improvement is possible (and should also bring about cost savings). Figure 8 illustrates the division of emphasis in this two-phase approach to achieving prevention: firstly concentrating on improvements in general waste management and secondly identifying opportunities for prevention.

Any hazardous waste prevention activities outlined in this chapter will be considered as part of the implementation of the next National Waste Prevention Programme[66] (NWPP). The NWPP is broad in its scope, and other opportunities to engage with sectors not mentioned in this chapter should be explored. The NWPP satisfies the new obligation in the revised Waste Framework Directive for Member States to prepare prevention plans that set out the State's waste prevention objectives. Article 29 of the revised directive states that "the aim of such objectives and [prevention] measures shall be to break the link between economic growth and the environmental impacts associated with the generation of waste".

Figure 8 The "evolutionary pathway" to prevention of waste and resource efficiency

The third cycle of the EPA's NWPP runs from 2014 to 2020 with the overarching objective to stimulate resource efficient behaviours and break the link between economic growth and environmental impact. More specifically, the NWPP will work to:

- Reduce wasteful consumption of material, water and energy resources by changing behaviours in businesses, households and the public sector;
- Enhance competiveness and reduce business costs by delivering programmes that stimulate resource efficiency and the circular economy;
- Support sustainable growth and employment in the green economy - including re-use enterprises;
- Minimise generation of hazardous wastes through efficient practices and use of safer alternatives;

66 The National Waste Prevention Programme was established in 2004 and is led by the Environmental Protection Agency. A portfolio of projects has been developed including the Green Business Initiative, comprised of the *greenbusiness.ie* free advisory service for improved business efficiency and the Green Hospitality Award for sustainable practices in the hotel and related sectors. See *www.nwpp.ie* for more information.

- Manage hazardous substances in products through efficient regulation;
- Inform and influence evidence-based decision-making by compiling and publishing high quality data on waste.

4.2.1 Role of research and innovation in prevention

Both in line with the above advocacy objective and because of their role in funding research the EPA and the DECLG have participated in the Research Prioritisation Exercise convened by the Department of Jobs, Enterprise and Innovation. The 2011 report[67] of the National Research Prioritisation Steering Group recommends 14 areas of opportunity, as well as underpinning technologies and infrastructure to support these priority areas, which should receive the majority of competitive public investment in Science, Technology and Innovation (STI) over the coming 5 years. The report also recognises the critical role of research for policy making and the fundamental role of research for knowledge. The recommendations in the report were adopted by Government in 2012. Action plans have been developed for each of the prioritisation areas as part of the ongoing implementation of the recommendations.

The Prioritisation Action Plans for the areas of Manufacturing Competitiveness and for Processing Technologies highlight the need for resource efficiency but research in many of the other priority areas (e.g. Medical Devices, Therapeutics, Diagnostics) should also address the issue of potential hazardous waste arisings and how to avoid them. In this way a forward-looking cohort of new industries will be built that are capable of meeting current and future regulatory requirements, while also protecting the valuable natural assets in our environment.

4.3 Prevention plans for prioritised sectors

Following on from the previous plan, six priority sectors, as listed in Table 16, have been identified for continuous engagement on hazardous waste prevention. The priority list will remain flexible, with addition or deletion of sectors as further study, information or opportunities might dictate during the revised Plan period.

Table 16 Six priority sectors for hazardous waste prevention

Sector	Typical hazardous wastes
Pharmachem	Solvents, other industrial hazardous waste
Agriculture	Waste oils, oily wastes, paints, pesticides, animal healthcare wastes
Healthcare	Healthcare hazardous waste (e.g. dressings, contaminated medical products and other general hazardous waste)
Households	Paint, pesticides, pharmaceuticals, batteries, fluorescent tubes
Publishing & Printing	Ink and varnish waste
Transport	Waste oils, oily sludge, lead acid batteries

67 http://www.djei.ie/publications/science/2012/research_prioritisation.pdf

The general tools outlined in Table 17, originally developed for the previous National Hazardous Waste Management Plan, should continue to be used, as appropriate, in engaging with the sectors identified as a priority for continued action on hazardous waste prevention activities. The sectoral approach should remain flexible and able to respond to specific sectoral needs and opportunities that may arise during implementation.

Table 17 General toolbox for sectoral engagement on waste prevention and resource use minimisation

Tool	Approach
Engagement with the sector	A review and advisory (steering) group could be established for each sector with membership drawn from sectoral representative, regulatory and other organisations. The sectoral representatives would serve as a two-way conduit for communications. Broad agreement should be sought on all proposed initiatives, though it should be recognised that consensus may not always be possible.
Engagement with individual organisations	Companies should be supported through site visits to determine the origins of good (or poor) performance. Detailed company-specific assessments should be carried out with specific reports generated for the company. The aim of the visits would be to identify transferable practices and technologies (or pitfalls), subject to commercial confidentiality, and to generate financial or environmental returns for companies. These visits should be clearly distinct from inspection or audit visits and should be intended to support and assist companies. Data should be used to contribute to sectoral performance comparisons.
Performance comparison and benchmarking	Detailed waste information is available from annual environmental reports (from EPA licensed companies) and general waste statistics. Company-specific data can be extracted and analysed for comparison, review of trends and identification of significant improvement (or deterioration) on a company and sectoral basis. A report should be published for the sector highlighting general trends. Examples of good performance should be published as case studies. Data should be analysed for best practice benchmarks that can be applied sector-wide. Commercially sensitive company-specific information should be kept confidential except where it is already publicly available and/or subject to legislation on freedom of information.
Environmental objectives and targets	Many industrial facilities are subject to EPA licensing. There are explicit requirements for prevention to be addressed in licences through a set of environmental objectives and targets. Licensees are obliged to ensure that these targets are challenging and are addressed. A review of the objectives and targets developed by licensees within a sector will illustrate the level of ambition within the sector for achieving the objectives/targets concerned. If the objectives and targets are adequately challenging, they can be used to set sectoral benchmarks. Where sectors are not covered by EPA licences, alternative sources of benchmarking information should be sought.
Research dissemination and studies	New research and case studies on best environmental practice, technologies and techniques should be disseminated within each sector. Funding should also be available for once-off sector-specific research that may be required. Funding to third-level institutes is also necessary in order to develop waste and resource management modules, and industry-led research projects so as to ensure availability of appropriately educated graduates in the areas of resource efficiency and waste management.
Financial support	Grant-aid to assist in material and equipment investment may be appropriate for certain sectors and may prove catalytic in driving innovation, efficiency and better environmental performance.

Pharmaceutical and chemical industry - sectoral prevention plan *(to be read in conjunction with Table 17)*	
Background: This sector is very important to Ireland's economy. Current manufacturing processes are dominated by the use of organic solvents, which in turn become the single largest hazardous waste stream in Ireland, much of which is recovered or recycled. There is a trend towards a greater proportion of products being manufactured by biotechnology routes, avoiding the use of organic solvents. Nevertheless, manufacture by chemical routes will continue to be important. The sector is likely to continue to seek more efficient manufacturing routes of its own accord (e.g. fewer steps, alternative or no organic solvents, continuous processing, green chemistry), but the changing nature of individual products and the associated synthesis routes means that predicting the inherent trend in waste arisings is uncertain. The sector should continue to be facilitated and guided in its efforts to improve. An Economic Study on Solvent Recycling and Treatment has been completed and there has been engagement between the EPA and the sector in this regard.	
Tool	**Approach**
Engagement with the sector	PharmaChemical Ireland is the main representative body for the sector. Notwithstanding the fact that EPA licences are facility and company specific, sectoral co-operation should continue to be encouraged and facilitated. Sectoral agreements may be appropriate and their use should be explored. The EPA should maintain engagement with the sector to examine issues concerning the treatment of solvent in Ireland and explore acceptable solutions to promote solvent recycling and recovery.
Engagement with individual companies	The pharmachem sector is technically highly competent. Engagement with companies should take place through equally experienced and competent personnel.
Performance comparison and benchmarking	Detailed waste generation information is readily available from annual environmental reports prepared by companies in the sector and provided to the EPA. These reports are publicly available. Data are also presented and analysed in National Waste Reports. The annual Responsible Care report, published by PharmaChemical Ireland, demonstrates the extent of waste prevention and reduction by the sector.
Environmental objectives and targets	Most companies in this sector are licensed by the EPA. Detailed information on any individual company's environmental objectives and targets is readily and publicly available. The data should be extracted, analysed and published annually. The sector's level of ambition in environmental objectives and targets should be analysed.

Tool	Approach
Research dissemination and once-off studies	The annual Responsible Care report, published by PharmaChemical Ireland, demonstrates the extent of waste prevention being carried out by the sector. The National Waste Prevention Programme will work with the Responsible Care initiative and seek to intensify the "reinvestment" of this and other relevant research back into the sector. Research and technological development efforts could continue to be directed to areas such as improved synthesis pathways (e.g. fewer steps, improved specificity, less hazardous solvents), continuous processing, improved recovery and enhanced process monitoring and control. The use of "environmental technologies" should be supported, but in the context of prevention, with an emphasis on avoidance, reduction and recovery.
Financial support	Any financial support to this sector will be small in relation to the sector's invested capital and turnover. A research and innovation fund should be made available, with support from the sector, to assist technological innovations, examples of which are given above. Ongoing support should be provided for training and education of staff in the sector.

Prevention - Green Enterprise (formerly Cleaner Greener Production Programme (CGPP))

Cleaner Production is the application of integrated preventive environmental strategies to processes, products and services to increase overall efficiency and reduce risks to humans and the environment. Using resources more efficiently has clear environmental and economic benefits for companies and organisations: it improves productivity, reduces costs and enhances competitiveness. Between 2008 and 2012, 24 different projects were funded under the CGPP Green Enterprise programme, across sectors such as food, IT, services and manufacturing. In total more than 50 companies and organisations were involved in these projects. Taking into consideration client and franchise roll-outs of the projects, these projects are now being implemented in almost 1,600 sites across Ireland. By way of example in terms of hazardous waste, in the case of one company, Tech Group, dry-ice cleaning of tools reduced hazardous waste from aerosols by 70%, saving €35,000.

Agriculture - sectoral prevention plan
(to be read in conjunction with Table 17)

Background: There are 139,860 farms in Ireland with the average farm being 32.7 hectares however 42% of farms are less than 20 hectares. The agricultural sector is geographically dispersed and the main farming enterprises are dairying, beef, sheep, tillage, pigs, poultry and intensive horticulture. The main hazardous waste streams generated by these enterprises include waste oils, wastes containing residues of oils and greases, waste paints, unused or de-registered agrochemicals, chemical and biocide containers, animal health wastes and aerosol cans. The type and diversity of the waste generated and the geographical distribution of farms in Ireland presents a challenge for waste collection and subsequent management. Animal health care wastes also present a biosecurity risk.

Since 2007, the EPA has collaborated and engaged with various stakeholders in this sector to facilitate and provide a mechanism whereby farmers can dispose of these wastes in an appropriate manner. The EPA and Department of Agriculture, Food and the Marine (DAFM) prepared and published guidance specific to triple rinsed pesticide containers. These wastes are being recovered through Farm Plastics Recycling Ltd. In 2013, IFFPG, European Recycling Platform Ireland (ERP Ireland) and WEEE Ireland operated co-collection bring centres for farmers across the country where farmers were able to bring waste electronic and electrical equipment with their farm plastics for recycling. A review of these joint operations will be undertaken. Farmers did avail of the service and also commented that it would be useful if the centres should cater for additional hazardous wastes that they have on their farms. The wastes identified included waste oils, filters, oil drums, grease gun tubes, de-regulated pesticides, old paints and animal health care wastes. Refer also to Section 5.2.1.2 regarding a recent farm hazardous waste collection pilot scheme.

Tool	Approach
Engagement with the sector	The EPA will continue to engage and work with key stakeholders including the IFFPG, Teagasc, DAFM, DECLG, Irish Medicines Board and relevant farming organisations and trade associations. Waste specific targeted campaigns should be considered to deal with stockpiling and legacy issues of hazardous wastes on farms. Existing farm extension/advisory programmes should be utilised to exchange information on waste prevention and minimisation. The EPA will also be engaging in a Smart Farming programme (*http://www.smartfarming.ie*), which is to look at resource use and efficiency on all farms across all sectors and highlight "top tips" in relation to resource efficiencies including waste minimisation.
Engagement with individual companies	See above.
Performance comparison and benchmarking	The development of farm type (tillage, dairy, horticultural, intensive pig, etc.) specific hazardous waste benchmarks may, for example, be explored having regard to national and international experience as may be available.

Tool	Approach
Environmental objectives and targets	The objectives for this sector is to move from current uncertainties in relation to the types and quantities of wastes being generated on farms and stockpiling of such wastes towards segregation and recycling opportunities to prevention as part of resource efficiency. The EPA will be funding work to develop more accurate waste generation models for this sector. Collaboration will continue with relevant stakeholders to implement waste specific initiatives to assist the sector to manage hazardous waste in a manner which contributes to the branding of Irish agriculture as clean and green. Smart Farming is an initiative which highlights ways that farmers can reduce their bills and maximise output through better resource management. Part of the initiative is a guide that provides top-tips to farmers on how to save money on feed, fertiliser, energy and water bills and prevent waste.
Research dissemination and once-off studies	Research and develop a waste model to estimate the quantities of hazardous and non-hazardous wastes on farms. Produce guidance for farmers on hazardous waste prevention and disposal to be disseminated through the Smart Farming programme. Sheep dip is a hazardous waste and should not be landspread in the absence of a waste licence. A study, undertaken by the EPA in consultation with relevant stakeholders, to evaluate and recommend an appropriate regulatory mechanism and relevant guidance for the management and disposal of spent sheep dip will be carried out during the revised Plan period. This will include a life cycle analysis of currently available treatment options for spent sheep dip. The Smart Farming Programme and existing farm extension advisory programme will be used to disseminate guidance on the management and minimisation of farm hazardous waste.
Financial support	Financial supports to farm and farm advisory bodies should be considered where necessary.

Prevention Case Study - Farming the Environment

This guide, published in 2008, gives farmers a number of specific easy actions they can take to reduce their costs by reducing consumption of water and energy, and preventing waste, which in turn reduces environmental impacts. The guide was developed by Monaghan County Council in association with County Monaghan Irish Farmers Association under the EPA's National Waste Prevention Programme.

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Healthcare - sectoral prevention plan *(to be read in conjunction with Table 17)*	
Background: The healthcare sector is predominantly publicly owned, though with important and large private facilities and small practices. A different approach is likely to be demanded by either side of the sector, though cost savings are likely to prove an attractive driver across the sector. A relatively small proportion of healthcare waste is classified as hazardous waste, but it is a waste stream of major concern from environmental, occupational health and safety and public health concerns. Infection control nurses advise on segregation of infectious risk waste and sharps, and poor segregation can result in unnecessarily high waste management costs being incurred. Infection control remains the overriding priority in the healthcare sector. The cost of healthcare risk waste treatment or export is relatively high, and there is scope for reducing the costs of the management of healthcare risk waste through appropriate waste segregation at ward level. By seeking to reduce the extent of this hazardous waste stream and diverting non-hazardous waste for recycling, where possible, opportunities for hazardous waste prevention are likely to become apparent.	
Tool	**Approach**
Engagement with the sector	The principal focus at national level is with the Health Service Executive (HSE). Considerable work is on-going in relation to promoting best practice waste management within the HSE. The HSE has updated guidelines on segregation, packaging and storage for healthcare risk waste in 2010 and also produced a Waste Management Awareness Handbook for HSE employees in 2012. The EPA NWPP is engaging with this sector through the Green Healthcare Programme (*www.greenhealthcare.ie*). It is important to engage also with private facilities and the small-scale private sector of general practitioners, dentists and others. Sectoral cooperation should be explored in trying to achieve specified targets.
Engagement with individual organisations	Evidence from recent EPA-funded projects suggests that there is scope for obtaining greater value for money for individual facilities. Engagement with individual facilities should focus around advising on waste management and reduction plans, with a focus on recycling in the first instance and moving on to examining waste generation overall. Good waste management control is most effective at the level of individual facilities and requires day-to-day intervention of motivated and cost-conscious local healthcare managers. This work should build on the HSE's existing awareness-raising, training and good practice monitoring projects. Considering the size of this sector there are benefits in actively disseminating the results and guidance arising from case studies under the Green Healthcare Programme.
Performance comparison and benchmarking	A small number of case studies (e.g. from the Green Healthcare Programme) provide initial benchmarking data in relation to waste and hazardous waste generation, segregation and costs. International benchmarks may also be useful in this sector. Individual facilities should be encouraged to measure their own performance for comparison against sectoral benchmarks.

Tool	Approach
Environmental objectives and targets	A combined top-down and bottom-up approach is most appropriate for this sector, with national benchmarks being set by the HSE or Department of Health, and hospital type specific targets put in place for local healthcare managers and budget-holders.
Research dissemination and once-off studies	Recent EPA-funded research has shown that raising awareness and taking simple steps can bring about major improvements in waste management and reduced waste management costs. The dissemination of case studies and relevant guidelines within the sector (e.g. Green Healthcare Programme) should be ongoing through proactive site visits and regional Green Healthcare seminars.
Financial support	The sector should be supported in responding to new environmental green public procurement criteria and for training and education of staff in the sector. The HSE is the largest public procurer of goods and services.

Prevention Case Study - Green Healthcare Programme

The Green Healthcare Programme has produced three 'How To' Guides, showing hospital staff how they can carry out waste prevention and resource efficiency activities themselves. The guides outline a step-by-step approach to all the required activities, providing clear assistance to hospital staff on how to save money and resources. For example, a Best Practice Guide has been produced on Healthcare Risk Waste Reduction.

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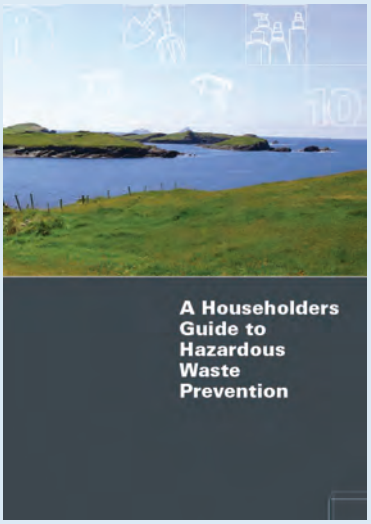
Households - sectoral prevention plan *(to be read in conjunction with Table 17)*	
Background: Households individually produce a small amount of hazardous waste, but this is often "unreported", possibly being mixed with general household waste or discharged to drain. Householders may be unaware generally of the hazardous waste they produce or how it should be managed. While the implementation of the waste electrical and electronic equipment (WEEE) and batteries regulations have greatly improved the situation, a more concerted effort is required to fully engage with the general public on its generation and management of hazardous waste. A wide range of hazardous product wastes are generated in households, for example: fluorescent (energy-saving) bulbs, solvent (VOC)-based paint and varnish, paint thinners, medicines, some batteries, some WEEE, leftover garden pesticides and herbicides, waste oil and other DIY vehicle servicing waste. Both compliance schemes have run special collection days and events for the collection of WEEE and batteries. The EPA NWPP is engaging with householders through the Green Home initiative (*www.greenhome.ie*).	
Tool	**Approach**
Engagement with the sector	While there is no representative body *per se* for the household sector, there are certain programmes aimed generally at householders. The EPA is supporting An Taisce's Green Home initiative. This is building on the successful Green Schools programme and seeks to take the environmental sustainability message into communities. Local authorities' general waste awareness and education activities are also key to making householders aware of hazardous waste and informing them of good practices and local facilities. The EPA-funded Local Authority Prevention Network (LAPN) programme is building capacity in local authorities in the waste prevention and resource efficiency fields.
Engagement with individuals	This will be achieved principally through such mechanisms as those mentioned above.
Performance comparison and benchmarking	In 2011, 0.43 kg of household hazardous waste per capita was collected. This has increased from 0.16 kg per capita in 2006, which demonstrates a significant improvement in collection rates during the previous plan period. This should serve as a benchmark on household activities, though improved collection should increase this number. Periodic household waste characterisation studies, commissioned by the EPA or local authorities, will provide information on the disposal of hazardous waste in waste and recycling bins. A national municipal waste characterisation study will be repeated periodically.
Environmental objectives and targets	The focus for engagement with householders should continue to be on improving collection rates and reducing the inappropriate disposal of household hazardous waste. The disposal of household hazardous waste in waste and recycling bins should be expected to decrease as: (a) information and awareness campaigns take effect; (b) more and better local facilities and collection services are made available; and (c) the influence and effect of free take-back of WEEE (including fluorescent lamps) and batteries continue to grow.

Tool	Approach
Research dissemination and once-off studies	An important factor in the prevention of household hazardous waste is to provide information on "green products" and alternatives to the use of hazardous cleaning, decoration and garden products. The promotion and use of eco-labels and other information mechanisms should be explored.
Financial support	The EPA NWPP should continue to support An Taisce's Green Home project and local authorities through the Local Authority Prevention Network. A funding or grant-aid mechanism should be made available to support other projects aimed at the prevention of household waste and resource efficiency in households. Producers of batteries are required to fund public information campaigns on the collection, treatment and recycling of batteries. Similar funding mechanisms could be considered for future PRIs.

Prevention Case Study - A Householders' Guide to Hazardous Waste Prevention

This booklet, published in 2010, contains tips and advice for householders on the correct use and disposal of everyday hazardous products. The information in this guide was prepared by the Regional Waste Management Office (RWMO) for Limerick, Clare and Kerry, working on waste prevention by participating in the Local Authority Prevention Network (LAPN) and working in partnership with the region's local authorities. In 2013, Local Authorities, via the LAPN, held workshops with Tidy Towns groups on household hazardous waste aspects (e.g. bring and swap leftover products, correct handling and disposal of this waste and advice on non-hazardous alternatives).



Publishing and printing industry - sectoral prevention plan *(to be read in conjunction with Table 17)*	
Background: The use of inks based on organic solvents leads to hazardous waste arising in this sector. Waste ink, containers, cleaning rags and solvents associated with cleaning are generated. The sector includes manufacturers of inks as well as consumers of ink, i.e. the printers. These operations vary in scale from local print shops for advertising leaflets, to newspaper printers and packaging suppliers. Minor improvements are likely to be possible for smaller operations, with the potential for major improvements, for example in the types of ink used, arising from partnership arrangements between ink suppliers and ink users. Major changes have occurred in this sector with the move towards digital systems. The EPA has supported several projects to investigate the use of non-organic-solvent inks. The trend of waste generation is uncertain, but the lessons already learned should be widely applied. Case studies under the Cleaner Greener Production Programme which demonstrate good practice and improved efficiencies are available on *www.greenbusiness.ie*. See also information overleaf on a best practice guide due to be published under a Green Print and Packaging Initiative 2012-2013, which was funded by the EPA.	
Tool	**Approach**
Engagement with the sector	The Irish Printing Federation is the main representative body for the sector. Sectoral co-operation should continue to be encouraged and facilitated. Mentors and champions should be sought from the larger EPA licensed operations and from progressive smaller operations. Sectoral agreements may be appropriate and their use should be explored.
Engagement with individual companies	This sector is specialised, and experienced personnel should be sought to engage with individual companies. Priority should be given to the larger, licensed operations and good practice demonstration should be provided to smaller operations that perhaps do not have the technical and financial resources to seek assistance in production and environmental efficiencies. An appropriate regulatory system should be considered for smaller unlicensed operations on foot of outcomes from sectoral engagement. This could be used to drive environmental efficiencies and obtain monitoring information.
Performance comparison and benchmarking	Detailed waste generation information is readily available from annual environmental reports prepared by EPA licensed companies in the sector. These reports are publicly available. The data should be extracted, analysed and published annually. Many operators are not licensed and other means of obtaining statistical information will be required. The data should be normalised against production data to ensure valid comparisons are made.
Environmental objectives and targets	The larger companies in this sector are licensed by the EPA. Detailed information on individual company's environmental objectives and targets is readily and publicly available. The data should be extracted, analysed and published annually. The sector's level of ambition in environmental objectives and targets should be analysed.

Tool	Approach
Research dissemination and once-off studies	Experience gained from case studies, available via *www.greenbusiness.ie*, and the best practice guide due to be published under a Green Print and Packaging Initiative 2012-2013 should be disseminated across the sector. The public sector commissions a significant proportion of the output from this sector. Environmental considerations should be included in green public procurement criteria, in particular the specification of inks.
Financial support	The sector should be supported in responding to environmental criteria in green public procurement and for training and education of staff in the sector.

Prevention Case Study - Resource Efficiency in the Irish Print and Packaging Sector

This best practice guide, to be published in 2014, aims to help the Irish Printing and Printed Packaging sector to save money, use resources more efficiently and improve environmental performance. The booklet provides tips on organising a resource efficiency programme, potential cost savings from raw material usage and reduction, waste management including tips for minimising hazardous waste and associated disposal costs, energy efficiency and water management hints and information on green procurement and eco-labels. The booklet is designed to help a wide range of companies across the sector and points out how many printing companies have saved significant costs through resource efficiency measures.

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Transport industry - sectoral prevention plan
(to be read in conjunction with Table 17)

Background: This sector includes road, rail, ship and air transport. As well as cars serviced by garages, it includes major fleet operators (e.g. An Post, Eircom, ESB, Bus Éireann, Dublin Bus, Iarnród Éireann), distribution companies, public service vehicles, visiting ships and aircraft. Hazardous waste is associated with the maintenance of these vehicles, typically being the replacement of spent or contaminated fluids and cleaning of parts. The scope for prevention is limited, though condition-based maintenance (based on distance travelled rather than time, for example) could be applicable for fleet operators and alternative paints relevant to repainting. The European Union (Installations and Activities Using Organic Solvents) Regulations (S.I. No. 565 of 2012) and European Union (Paints, Varnishes, Vehicle Refinishing Products and Activities) Regulations (S.I. No. 564 of 2012) govern installations and activities using organic solvents, such as vehicle refinishers for the purpose of preventing or limiting emissions of volatile organic compounds.

Proper collection, segregation, reporting and general environmentally sound management presents the greatest potential to improve performance in this sector and identify future actions for prevention. In 2010, the EPA published a Smart Garage Guide which is aimed at promoting best environmental practice in garages. This guidance is applicable to the transport sector as it covers energy efficiency, waste management (including management of waste oils, mixed fuels, brake fluids and antifreeze, batteries, WEEE and aerosols) and water management.

Tool	Approach
Engagement with the sector	There are numerous large transport companies, fleet operators and garages within the sector. Sectoral engagement should be encouraged and facilitated.
Engagement with individual companies	The priority for this sector is to ensure compliance with existing waste management legislation. For example, the unauthorised use of waste oil in burners for space heating in car garages has been reported. There should be continued engagement in enforcement and awareness activities in this regard (e.g. targeted inspections and awareness via national and sector advertisements (e.g. car garages)). As compliance levels increase and information begins to feed back from enforcement studies and campaigns, greater opportunities should arise for engagement with the sector on preventive approaches and encouraging good environmental practices (e.g. further dissemination of the Smart Garage Guide). Contact should be made with larger operators to explore best practice measures that can be centrally disseminated and replicated in smaller operations.
Performance comparison and benchmarking	As data become available, through dedicated studies, it may be possible to set benchmarks objectively for certain classes of activity in the sector.
Environmental objectives and targets	The sector is not highly regulated and data are not generally available. As data become available, it may be possible to set environmental objectives and targets for the sector as a whole or for certain activities or operations.
Research dissemination and once-off studies	A best performance study should be undertaken to identify the actual range of performance with regard to materials use and waste management actually occurring within the sector, the benchmarks that are achieved, associated best practices and opportunities for improvements and cost savings. These outcomes and real case studies should be disseminated across the sector. Guidance on record keeping and provision of waste data to regulatory authorities, as required under existing legislation, should be provided (e.g. Smart Garage Guide). Sectoral level data are key to planning for greater environmental efficiencies and preventive approaches.
Financial support	The sector should be supported in responding to new developments and for training and education of staff in the sector.

4.4 Implementation

4.4.1 Qualitative or product-based prevention

Hazardous waste may also be prevented by reducing the "hazardousness" or hazardous components/ ingredients in products during design and production. The revised Waste Framework Directive includes within its definition of actions for prevention "the content of harmful substances in materials and products". There are already a range of regulations in place that control the content of hazardous materials in specified products or articles (see Chapter 2). These include regulations on the Restriction of Hazardous Substances (in electrical & electronic equipment), Persistent Organic Pollutants (POPs), Packaging (Essential Requirements), Batteries & Accumulators and Decorative Paints. Other legislation controlling the impact of products that may become hazardous (or environmentally harmful) wastes after use includes End of Life Vehicles (ELVs), Polychlorinated Biphenyls (PCBs), POPs, Solvents (incorporated into the Industrial Emissions Directive), Ozone Depleting Substances (ODS) and Fluorinated Greenhouse Gas (F-gas) Regulations. Enforcement and compliance with these regulations will reduce the health and environmental impacts of these potentially hazardous and harmful substances. The EU REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) Regulation should also reduce hazardous materials and products over time. Relevant public bodies should continue to cooperate in enforcement activities concerning product-based pollution prevention.

Prevention Case Study - Batteries & Accumulators

In 2006 the EU adopted legislation which sought to make batteries and accumulators less harmful to the environment. The Batteries Directive includes a specific ban on batteries and accumulators containing mercury and cadmium, but an exemption was provided for batteries for cordless power tools and button cells containing low levels of mercury. There has been a recent agreement on lifting an exemption on a ban of the use of cadmium in cordless power tools and mercury (low levels) in button cells. The main benefits of the agreement will be:

- Substantial reduction in the amount of cadmium annually brought into the European economy and used in everyday products and a corresponding reduction in the risk of cadmium releases into the environment;
- Reduction in the intentional world extraction of cadmium from primary resources by more than 10%;
- Reduction in the environmental impact from the use of mercury and the risks associated with mercury being released into the environment given that button cells, due to their size are often inappropriately disposed of in municipal waste; and
- Acceleration of the switch to the manufacture of mercury-free batteries.

It is recommended that within the revised Plan period, a waste characterisation study, commissioned by the EPA via the NWPP, be carried out to profile hazardous waste arisings from smaller sources (e.g. households and SMEs) to determine if product-based legislation is having its desired effect and the hazardousness of related waste streams is reducing.

4.4.2 Role of the National Waste Prevention Programme

The EPA's NWPP leads and co-ordinates a wide range of prevention initiatives. The NWPP, through the Cleaner Greener Production Programme, has provided financial support to Irish-based businesses to "green" their processes and to produce products/services in an environmentally friendly manner. This links well with Enterprise Ireland's Green Offer initiative for Irish-based manufacturers[68]. The EPA has recently rebranded the CGPP as the "Green Enterprise Programme" and applications are currently being assessed for the seventh tranche of funding.

The EPA NWPP also supports environmentally improved services through the Green Healthcare initiative (with particular regard to hazardous waste streams) and the Green Hospitality Programme.

The NWPP should continue to be a priority for the State and should co-ordinate the principal prevention initiatives outlined in this revised Plan, and create opportunities for engagement at the sectoral and enterprise level. It will be critical that sectoral representatives and individual organisations actively engage with the programme. Prevention is a long-term initiative that, quick initial gains aside, may take some time to register success at the sectoral or national level.

4.4.3 Local implementation of the prevention plan

Local authorities should continue to provide the necessary out-reach to industry and small businesses and communities in their functional areas from the NWPP. Prevention forms an important part of all local and regional waste management plans, and these provisions should be implemented in full, especially in relation to hazardous waste. Such supports to local businesses will also enhance their viability to safeguard existing employment and to create new jobs. Local authorities are currently supported by the NWPP via the Local Authority Prevention Network (LAPN)[69]. Many local authorities have been grant-aided to demonstrate prevention and resource efficiency in their own offices, in airports, shopping centres, communities, farms, construction sites and local businesses. The work done by these local authorities has demonstrated that considerable progress can be made when staff are dedicated solely to waste prevention projects. These local authorities in turn help other local authorities implement waste prevention initiatives and a well-functioning network has formed, co-ordinated by the EPA and other participating (expert) organisations.

68 See http://www.enterprise-ireland.com/en/Productivity/Build-a-green-sustainable-Business

69 The LAPN programme is an initiative of the National Waste Prevention Programme administered by the EPA and funded by the Department of the Environment, Community and Local Government from the Environment Fund.

The network has two key ingredients:

(1) a network core, including a resource rich website (*http://localprevention.ie*), to keep members informed, co-ordinate information sharing, operate working groups, organise meetings and conferences, and run training courses; and

(2) access to project-based grant-aid, to support projects and provide local authorities with the financial means to allocate staff to prevention projects.

The benefits of providing the two elements of LAPN are considerable – (1) a network of trained, motivated and professional prevention officers providing services and advice to their own organisations, local business and communities on waste prevention and environmental sustainability, and (2) senior local authority management interested and engaged in waste prevention.

Prevention and Business Development Officers should continue to be empowered to assist local business, industry and public sector organisations to develop preventive approaches to all their activities as well as promoting waste prevention in their local communities. Prevention officers should also be empowered to form internal green teams with relevant colleagues to ensure that local authorities' own internal activities and practices demonstrate best environmental practice in relation to prevention of hazardous waste in particular.

4.5 Potential for all-island co-operation

The industrial profile and consumption patterns in Northern Ireland are not markedly different to those in the Republic of Ireland, though some key differences exist. The potential for cross-border initiatives in hazardous waste prevention was a recommendation in the previous plan. This recommendation is still valid in that the DECLG should seek to establish, with the appropriate Northern Ireland authorities, a North-South co-operative group working on hazardous waste issues.

Northern Ireland authorities have, for example, expressed interest in replicating the Green Home programme in their jurisdiction. The production of benchmarking data, sectoral studies and household hazardous waste prevention guides may have relevance in both jurisdictions and common issues should be identified and communicated, thus ensuring that enterprises and individuals north and south have access to the best available information, guidance and tools.

5. Unreported hazardous waste

The previous plan attempted to illustrate the potential scale of unreported hazardous waste and indicated that, in 2006, an estimated 29,888 tonnes of hazardous waste were potentially classified as unreported (10% of the volume managed). Some improved data are presented in Appendix F including updated estimates but definitive estimates are elusive or difficult to quantify. The issue of unreported hazardous waste should continue to be addressed during the implementation period of this revised Plan. The problem of unreported waste can be exacerbated by a lack of collection facilities for hazardous waste from a diverse range of sources, mostly small scale, including households, small businesses and farms. The challenge and particular priority for the revised Plan is to maximise the collection of hazardous waste. The solution to this problem is centred on providing comprehensive collection services and infrastructure, supported for some waste streams by producer responsibility obligations where considered feasible. The availability of these services and facilities needs to be widely and systematically publicised. There must also be consistent inspection of hazardous waste producers/holders and appropriate enforcement actions taken, as necessary. The objective is to ensure that a high proportion of hazardous waste and its appropriate management are duly reported. The remainder of this chapter outlines some options for implementing solutions.

5.1 The current situation

Any generator or holder of hazardous waste has four main legal choices of service at present, depending on the scale and nature of the waste generated:

- commercial hazardous waste collection (at source), mainly serving industrial and certain commercial customers, where waste is taken to a treatment facility in Ireland, is directly exported or is stored temporarily at an authorised transfer station;
- civic amenity sites, designed to accept small quantities of waste from householders and, in limited circumstances, small businesses;
- retail take-back, limited at present largely to waste electrical and electronic equipment (WEEE), batteries/accumulators and End-of-Life Vehicles (the latter in the form of free deposit at authorised treatment facilities); and,
- mobile and periodic drop-off services provided by local authorities or compliance bodies (e.g. WEEE, batteries, farm plastics) and serving communities on an occasional basis.

5.1.1 Commercial hazardous waste collection

The private hazardous waste industry plays a key role in serving Irish industry and commerce. It enables the proper movement, off-site treatment and/or preparation of hazardous waste for export and is available at commercial cost to industry. However, this full commercial cost is often prohibitive to smaller industry and commerce, especially where smaller quantities of hazardous waste are generated - often infrequently - and unit costs are very high. There is a need to provide for the collection of small quantities of hazardous waste from businesses, farmers, and commercial and public sector organisations that are not currently served, for whatever reason, by existing commercial services.

5.1.2 Civic amenity sites (recycling centres)

A network of 113 civic amenity sites was operated by local authorities and the private sector in 2011. All 34 local authority areas are served by at least one facility that will accept WEEE with 43 also accepting waste batteries and waste oils, 41 also accepting waste paints/varnish and 17 also accepting general household hazardous waste. For other household hazardous wastes, a deposit service is not generally available. Most of the facilities do not accept similar hazardous waste from small businesses, despite the fact that the nature and quantity of the waste is more or less the same as that of household hazardous waste. There is a need to develop this static collection network, where feasible, to ensure that householders and small businesses can dispose of a full range of hazardous wastes. Apart from waste supported by compliance schemes, there may be a case for levying a charge for such services. It should be noted that national regulations[70] allow household hazardous waste to be accepted under a Certificate of Registration for storage at a civic amenity facility, recycling centre or central collection point pending onward transport and submission to recovery at an authorised facility.

5.1.3 Retail take-back

Retail take-back is a useful method of collecting small quantities of hazardous waste from the public. Retailers will generally, and understandably, provide this service only when legally obliged to do so. At present, retail take-back obligations exist solely for WEEE and waste batteries. The model for WEEE has worked especially well to date, and suggestions for its replication for a range of hazardous wastes are further detailed below. Some pharmacists will take back unused medicines, and the HSE has funded unused medicine take-back schemes in several areas in partnership with the relevant local authorities. However, there is no legal obligation on pharmacists to take back medicines and this means the service, although well subscribed by the public, is not widely available. In 2011, the Pharmaceutical Society of Ireland established guidelines[71] on the sourcing, storage and disposal of medicinal products within a retail pharmacy business to facilitate compliance with the Regulation of Retail Pharmacy Businesses Regulations 2008. Section 3.1.6 of the guidelines on patient counselling outlines that patients should be facilitated and encouraged to return unwanted or expired medicinal products to the pharmacy for disposal.[72] Furthermore, pharmacists should inform patients that it is not appropriate to dispose of waste medicinal products in their household waste or through the mains water drainage system.

5.1.4 Mobile collection services

A contract mobile collection service has been availed of by local authorities for use by the public. In 2011, 71 tonnes of hazardous waste was reported as being collected (the largest waste streams collected being waste paint and varnish, household hazardous waste). The service typically involves a hazardous waste collection vehicle parking in a public place, such as a shopping centre car park, for a period of some hours, and accepting hazardous waste from members of the public. The service is advertised locally in advance. This is an expensive service for local authorities to provide, but it engenders publicity and awareness of hazardous waste collection and is a useful complement to permanently available static facilities such as civic amenity sites.

70 Class No. 1 of Third Schedule: Part II of Waste Management (Facility Permit And Registration) (Amendment) Regulations 2008

71 Available at http://www.thepsi.ie/Libraries/Publications/Guidelines_on_the_Sourcing_Storage_and_Disposal_of_Medicinal_Products.sflb.ashx

72 See also EU Guidelines of 7 March 2013 on Good Distribution Practice of Medicinal Products for Human Use (2013/C 68/01).

Special collection events have also been undertaken by the compliance bodies for WEEE/Batteries (WEEE Ireland and ERP Ireland) and for farm plastics including triple-rinsed pesticide containers (Farm Plastics Recycling Ltd in partnership with the Irish Farm Films Producers' Group (IFFPG)) throughout the country. In 2011, 250 events[73] were held by WEEE Ireland (3,241 tonnes collected) and by ERP Ireland (404 tonnes collected) and up to 200 events per year are conducted by IFFPG (15 and 17.5 tonnes collected in 2010 and 2011, respectively).

In summer of 2013, IFFPG, ERP Ireland and WEEE Ireland operated a pilot co-collection service for farmers across the country. Farmers were able to bring WEEE and batteries with their farm plastics for recycling.

5.2 Recommendations for the improved collection of hazardous waste

Similar to the previous plan, solutions are recommended below that focus on the small-scale hazardous waste streams that arise at small businesses, households, farms, local healthcare services and other sources. Other hazardous waste streams not specifically identified below may also need to be addressed via one or more of the identified routes. To improve collection of unreported hazardous waste, funding via producer responsibility initiatives should be considered where feasible, in order to support civic amenity and mobile collection services, in addition to guidance and awareness activities. It should be noted that producers of hazardous waste have legal obligations to ensure the proper management of hazardous waste.

5.2.1 Commercial collection at source

As discussed above, hazardous waste collection services are provided at source by an existing network of brokers, hauliers and transfer stations. The waste industry is operating in a competitive environment and therefore focuses only on waste streams that offer a commercial return. However, there are situations where the collection of small-scale unreported hazardous waste is best done by commercial services offered at source. Policy, economic or enforcement drivers will be required to ensure that this happens. The following sources of hazardous waste continue to be priorities for action:

- garages and other locations where vehicles are serviced or dismantled;
- farms;
- ports and harbours; and
- healthcare risk waste from individual households.

It is also considered that opportunities for improved hazardous waste management exist to facilitate local or sectoral industry to act co-operatively in their management of hazardous waste and engagement with the waste industry. Other sectors are dealt with in a more general manner in Section 5.2.1.6.

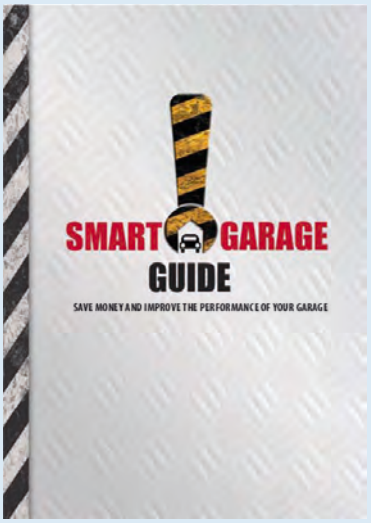
73 Special events include *inter alia:* special collections days, events and island collections.

5.2.1.1 Garages and other vehicle service and dismantling locations[74]

Waste oils from the servicing of vehicles are currently collected from the majority of garages, although in winter the unauthorised combustion of waste oil in space heaters is reported to be significant and a growing problem. The supply of cleaning solvent and associated equipment for cleaning machine or engine parts and spray guns, and the collection of spent solvent, is also a readily available commercial service. Although services are available for other hazardous waste streams such as oil filters, lead acid batteries and cleaning rags, these may not always enter the permitted hazardous waste management routes. The key to improved hazardous waste management at garages is continued information and awareness, and enforcement.

Guidance & Awareness - Smart Garage Guide

In 2010, the EPA published the *Smart Garage Guide* which is aimed at promoting best environmental practice in garages. It outlines the different ways in which operators can save resources and money through making small changes in their day to day operations including in areas such as hazardous waste management.



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5.2.1.2 Farms

An affordable and accessible farm waste collection system is necessary for a range of farm hazardous wastes including animal and plant protection product containers, unused or out-of-date animal health medicines and pesticides, waste oils, oil filters, empty cartridges (e.g. grease guns), aerosols, WEEE, paints, batteries and other hazardous farm wastes.

A farm hazardous waste collection pilot project to inform such a collection system was carried out in November 2013, which focused on the collection of hazardous farm wastes such as animal and plant protection product containers, unused or out-of-date animal health medicines and pesticides, waste oils, oil filters, empty cartridges (e.g. grease guns), aerosols, WEEE, paints, batteries and other

74 This sector is well served by several commercial waste collectors and treatment facilities.

hazardous farm wastes[75]. The project, involving six bring centres, was a collaborative effort between the EPA, Pesticide Control Division of Department of Agriculture, Food and the Marine, Teagasc, six local authorities, Rilta Environmental Ltd (a hazardous waste contractor), WEEE Ireland and European Recycling Platform Ireland (ERP Ireland). The aim of the joint initiative was to research the need for a national farm hazardous waste collection scheme; characterise farm hazardous waste; identify and estimate types and quantities of de-regulated pesticides remaining on farms; pool resources and collective expertise between the various agencies and departments, facilitate the removal of hazardous wastes from farms and ensure their recovery/disposal is managed in accordance with national and European waste legislation. The pilot project was very successful in terms of the positive uptake from the farming community and ultimately removing hazardous waste from farms, with an estimated 94,472 kg of farm hazardous waste and 22,228 kg of WEEE and batteries collected at the six pilot bring centres.

As outlined previously, a pilot co-collection project took place with IFFPG and the two WEEE compliance schemes during the summer of 2013, and the feedback on the success of these initiatives should inform any future initiatives.

National regulations[76] provide for the return of unused or expired animal remedies to the point of purchase. However, there may be legislative barriers such as waste licensing requirements that may discourage such take-back. Teagasc in association with Veterinary Ireland has prepared a booklet[77] for farmers on the safe use of livestock medicines for cattle and sheep farms, including disposal of medicines/materials.

Recent enacted legislation concerning the sustainable use of pesticides[78] includes new requirements concerning retailers and distributors, the use of pesticides by professionals and amateurs, registration, inspections, record keeping, and training and awareness on their correct use and application.

5.2.1.3 Ports and harbours

The European Communities (Port Reception Facilities for Ship-generated Waste and Cargo Residues) Regulations, S.I. No. 117 of 2003, oblige harbour masters and port authorities to prepare waste management plans for the management of ship-generated waste and cargo residues at Irish ports and harbours. There should be continued information and awareness and enforcement to ensure appropriate hazardous waste management at ports and harbours.

5.2.1.4 Healthcare risk waste from small sources

Considerable efforts are on-going on the part of the Health Service Executive (HSE) to ensure that healthcare non-risk waste and healthcare risk waste are properly managed in a cost-effective manner. The Green Healthcare Programme (*www.greenhealthcare.ie*) which became fully operational in 2010 is an initiative by the EPA under the National Waste Prevention Programme and aims to prevent waste and reduce costs. As the HSE is the largest public service in the State, there is scope to disseminate the information and guidance from the Green Healthcare Programme to all HSE employees, as appropriate. This forms a recommendation in this revised Plan.

75 Interim report available at *http://www.epa.ie/pubs/reports/waste/haz/pilotfarmhazardouswastebringcentresin2013interimreport.html*
76 European Communities (Animal Remedies) (No. 2) Regulations, S.I. No. 786 of 2007
77 Available at *http://www.teagasc.ie/publications/2003/vetleaflet.pdf*
78 European Communities (Sustainable Use of Pesticides) Regulations, S.I. No. 155 of 2012

There still remain issues that have been identified in relation to the management of small quantities of healthcare risk waste, arising particularly through self-administration of medicines and healthcare procedures carried out in the home. The HSE should continue to ensure that adequate and suitable systems are in place to manage healthcare waste generated within HSE facilities and services for which the HSE is responsible. There may still be a case for a producer responsibility initiative in this area (and consideration should be given in the context of the recently established review of existing producer responsibility initiatives) whereby producers of medical products facilitate safe take-back of used materials, where possible, including from self-administering patients in the home.

5.2.1.5 Industrial estates and commercial clusters

As mentioned in Section 4.4.3, many local authorities have been grant-aided via the Local Authority Prevention Network (LAPN) to demonstrate prevention and resource efficiency in their own offices, in airports, shopping centres, communities, farms, construction sites and local businesses. Considerable efforts have been made in recent years by LAPN in relation to the prevention and correct management of hazardous waste. Local authorities should continue to work with local industry and commerce (whether on a geographical or a sectoral basis) to seek commercially favourable hazardous waste collection solutions for industry. There may be opportunities at the planning stage for new commercial or industrial areas to provide centralised or co-ordinated approaches to waste and particularly hazardous waste management. Local authority Business Development Officers should be empowered to assist industries to club together to create networks and get collective deals on waste services to the benefit of all parties, generator and service provider alike.

5.2.1.6 Other sectors

A large number of other sectors (e.g. construction, industrial, retail, private healthcare) are sources of unreported hazardous waste and predominantly use commercial waste companies to collect hazardous waste at source. Local authorities should focus enforcement efforts to ensure that all generators of hazardous waste are managing hazardous waste in accordance with their statutory obligations. The Network for Ireland's Environmental Compliance and Enforcement (NIECE) may be an appropriate means of co-ordinating concerted actions, procedures and protocols.

5.2.2 Civic amenity sites and recycling centres

As outlined previously, 0.43 kg of household hazardous waste per capita was collected in 2011. This has increased from 0.16 kg per capita in 2006, which demonstrates a significant improvement in collection rates during the previous plan period and measures that local authorities have taken to provide collection facilities for household hazardous waste.

Local authorities should be adequately resourced by the DECLG to provide directly or via private enterprise for the collection of a full range of hazardous waste at civic amenity sites from households and small local businesses in their functional areas where this is considered feasible. It is recognised that resources are lacking, however finance could be raised from producer responsibility initiatives and other policy initiatives (e.g. export levy) to help pay for this infrastructure.

In recent times conditions have been included in waste licences (e.g. Corranure Landfill, Licence no. W0077-04) whereby hazardous waste of a similar nature to household hazardous waste may be accepted at the civic amenity facility from business customers and other non-household sources, including farms.

Small businesses could be charged equitable not-for-profit rates for this service. To avoid abuse, businesses could be subject to caps or quotas on the amount of hazardous waste that can be deposited per company in a defined period[79]. Misuse of this service could be made an offence under potentially revised hazardous waste regulations, and this should be kept under review. Innovative means of facilitating business use and payment, for example through pre-registration of waste delivery via a secure internet site, could minimise abuse of the service while making the service convenient and economical for businesses and allowing them to track their own deposits.

The EPA is progressing the development of a code of practice/guidance document on the minimum operational and environmental standards for accepting hazardous waste at civic amenity sites and on the types of hazardous waste that a civic amenity site would be expected to accept.

As part of the development of the code of practice/guidance, the EPA sponsored a pilot training course for civic amenity site staff. The code of practice/guidance document will be completed in the near future and disseminated to local authorities and civic amenity operators.

Collective approach by local authorities

There is now an opportunity for the recently configured three waste management regions to plan for the provision of civic amenity site services to householders and businesses where deficiencies are identified. The role of planning authorities is also important. Planning authorities and An Bord Pleanala are required to ensure that such measures as are reasonably necessary are taken to secure appropriate provision for the management of waste within developments, including the provision of facilities for the storage, separation and collection of such waste.[80]

A certain level of consistency in services from civic amenity sites, particularly to businesses, is considered desirable. Sharing of information within a region (e.g. through shared on-line pre-registration services) on business use of facilities could minimise businesses "shopping around" civic amenity sites. Collective tendering by local authorities for contracts to manage the deposited waste from several civic amenity sites would reduce unit costs to local authorities and service providers alike.

79 The reason for this proposal is to ensure that businesses that generate large quantities of hazardous waste only use commercial collection sources and do not overburden the local authority system.

80 Section 26 of Protection of the Environmental Act 2003 amends the Waste Management Act (WMA) 1996 by inserting this requirement under Section 22 (10D) of the WMA 1996.

Asbestos

There is still a lack of appropriate facilities for the acceptance of waste asbestos in Ireland. This revised Plan continues to recommend that a network of collection and transfer facilities be established to capture the small-scale arisings from DIY and small contracting jobs. Without such facilities, substantial quantities of asbestos waste may be managed illegally, due to either ignorance of legal obligations or the high cost of employing specialist contractors for small jobs.

Consideration should be given for local authorities to be resourced and then directed by the DECLG to provide at least one transfer station or other appropriate facility for small quantities of asbestos in each local authority area. A possible solution is to use the existing civic amenity site network, wherever suitable. Where local authority-owned sites are not available or suitable, it may be possible for local authorities to contract authorised private sector waste facilities to accept asbestos on their behalf. The development of this network would be expected to provide reassurance that there is no reason for illegal or "backyard" disposal or accumulation of asbestos. This issue should be taken into account during the development of the replacement regional waste management plans.

Existing guidance on asbestos is available at: *http://www.epa.ie/waste/hazardous/asbestos.*

Information to householders and small businesses

In 2010 an information booklet on household hazardous waste was prepared by the Regional Waste Management Office (RWMO) for Limerick, Clare and Kerry and contains tips and advice for householders on the correct use and disposal of everyday hazardous household waste. This booklet is available at:

http://www.epa.ie/pubs/reports/waste/wpp/ahouseholdersguidetohazardouswasteprevention.html

Legislative requirements to ensure hazardous household waste is not mixed with non-hazardous household waste are a driver for improved management of household hazardous waste. For example, in July 2013, Dublin City Council introduced byelaws[81] that include a requirement to exclude hazardous waste from household waste collections and to dispose of it at an approved facility.

Householders and small businesses should continue to be informed through ongoing information campaigns, conducted by or on behalf of local authorities, of the hazardous waste collection services available in their areas.

Practical guidelines on the segregation and storage of hazardous waste at households and business should be provided. Central co-ordination of information campaigns, particularly the use of social media (e.g. Twitter, Facebook), may be appropriate. Finance could be raised from producer responsibility initiatives to help pay for information campaigns.

81 Dublin City Council (Storage, Presentation and Collection of Household and Commercial Waste) Bye Laws 2013

Recycling Centre / Civic Amenity Centre Information

Repak has developed a search facility and mobile phone app to help you find out where your local recycling facility including facilities that accept household hazardous waste is located.

Source: www.repak.ie

Mobile collection services for householders

Local authorities should continue to avail of contract mobile collection services, where available, both to raise awareness about household hazardous waste and to fill geographical gaps in static facilities' service provision, and should be considered in the context of geographical areas that are remote or distant from civic amenity sites. Mobile collection services can be used to highlight seasonal wastes, for example the collection of surplus garden chemicals or lawnmower waste oils at the beginning or end of summer. Mobile collection services are expensive, and should only be deployed strategically to meet specific needs and objectives. They should not be considered solely as an alternative to a permanent civic amenity site accepting a full range of household and similar hazardous waste.

Implementation timetable

Public authorities should continue to progress the development of a comprehensive hazardous waste collection network and information awareness for householders and small business within the lifetime of this revised Plan, i.e. over the next six years. Public authorities should continue to progress the implementation of the recommendations outlined in this section (see also Chapter 8) and provide information to the EPA at regular intervals on progress on their implementation during the revised Plan period.

5.2.3 Producer responsibility and retailer take-back

Producer responsibility is based on the principle that producers[82] of products take financial responsibility for the collection and management of their products at end-of-life. It is an economic means for producers to maximise the collection and recovery of products at their end-of-life. It can also lead to better life-cycle management of hazardous materials. Producer responsibility obligations have become a mandatory requirement for a number of waste and hazardous waste streams - packaging waste, farm plastics, WEEE, end-of-life vehicles and batteries - see Table 18. Both packaging and WEEE collection and recycling rates have increased as a result of the respective producer responsibility initiatives. The collection of WEEE and waste batteries has been particularly successful in a very short time for many reasons, not least of which is the free take-back obligation imposed on retailers.

Table 18 Existing producer responsibility obligations for hazardous waste

Material	Collection route(s)	Funding model
Waste electrical and electronic equipment (WEEE) (introduced 2005)	Retail/producer take-back or no-less-convenient alternative Civic amenity sites	Collection and recycling costs to be borne by producers
End-of-life vehicles (introduced 2006)	Free-of-charge delivery at authorised treatment facilities (ATFs)	Producers are ultimately liable for full cost of treatment
Animal remedies (introduced 2005)	Retail (veterinary/pharmacy/co-op) take-back	None established
Batteries (introduced September 2008)	Retail take-back Civic amenity sites	Collection and recycling costs to be borne by producers

Proposed models of producer responsibility vary depending on the waste stream and the purpose of imposing the obligation. In certain cases the waste stream may be prohibitively expensive for local authorities to manage at civic amenity sites. Alternatively, retail take-back as part of producer responsibility may be an appropriate means of improving collection rates. Some particular advantages of retail take-back include:

- Potential for high public participation and awareness rates due to the frequent use of retail outlets;
- a new-for-old pattern of consumption could become the norm;
- deposit-refund mechanisms are suited to retail take-back models and may be suitable for some materials;
- additional car-based trips to civic amenity sites can be avoided;
- producers and industry can employ reverse logistics in the retail supply chain[83]; and

82 Generally defined in producer responsibility legislation as manufacturers or importers – being the persons who place goods on the Irish market at the top of the supply chain.

83 Reverse logistics means transporting end-of-life goods on vehicles on their return journey after they have delivered new goods to the retailer.

- producers take full responsibility for the waste, in theory stimulating redesign of products, packaging and supply chains to minimise costs to producers and customers, thus reducing environmental impacts.

However, not all hazardous wastes are suited to retail take-back. For example, liquid hazardous wastes or hazardous waste in powder form could present a risk to retail staff and consumers. Retail take-back obligations must take account of health, safety and environmental concerns in the storage and management of hazardous waste in retail outlets, particularly small outlets.

The previous plan recommended the consideration of producer responsibility obligations for several additional hazardous waste streams, including the following:

- Human medicines
- Farm animal medicines
- Waste oil
- Oil filters
- Paint and paint containers
- Pesticides and herbicides (household)
- Ink and ink containers from publishing

In 2012 the DECLG commenced a wide ranging review of existing producer responsibility agreements currently in operation in Ireland which is also examining the feasibility of the introduction of additional producer responsibility initiatives for waste streams, including hazardous wastes. The review is required to have particular regard to those waste streams recommended in the previous National Hazardous Waste Management Plan (2008-2012) as suitable for further evaluation as possible producer responsibility initiatives. The report of this review is expected to be published in 2014.

This revised Plan recommends that the DECLG complete the examination of potential producer responsibility obligations concerning the above hazardous waste streams and progress the establishment of producer responsibility initiatives for such waste streams, where feasible. In particular there is a need for a nationwide take-back scheme for unused or expired human medicines considering the widespread consumption of medicines, the likely uptake of this service (refer to Section 5.1.3) and the potential for the prevention of environmental pollution. Industry buy-in will be important for the success of producer responsibility initiatives, and producers should be involved at an early stage in any new initiatives.

With changes in EU directives (new WEEE Recast) and associated targets, it is likely that the producer responsibility landscape will be more complex in the future and compliance schemes will need to work more closely together and examine synergies to help achieve overarching national objectives. Future arrangements with compliance schemes will be focusing on corporate governance, flexibility and cooperation to respond to new policy direction and operational instructions, which could have relevance in the future in terms of hazardous waste.

A producer responsibility initiative in an area such as hazardous farm wastes could be funded by levies on producers and/or importers of relevant products that generate the hazardous wastes. The service could comprise a network of mobile and/or static facilities at convenient locations such as co-ops,

marts, and civic amenity sites. Expansion of the existing farm plastics recycling scheme could also provide such a mechanism. This would in effect offer the farming community a one-stop-shop to manage a range of hazardous wastes helping to promote more sustainable farming in Ireland. The feedback of the success of the current pilot co-collection project that took place with IFFPG and the two WEEE compliance schemes during the summer of 2013 in addition to the above-mentioned pilot project on farm hazardous waste collection should be used to inform any potential producer responsibility initiative in this area.

6. Treatment of hazardous waste

The treatment[84] of Irish hazardous waste generally takes place under regulated and controlled conditions. Currently almost half of this treatment takes place abroad, in other EU Member States for the most part. The EU Waste Framework Directive requires that a policy of national self-sufficiency in disposal installations be adopted by Member States where this is possible on the grounds of strategic need and conformance with the proximity principle. Hazardous waste destined for recovery is subject to an open and competitive waste market in the EU (i.e., not subject to the Proximity Principle[85]). This chapter sets out options for the provision of hazardous waste treatment services in Ireland in order to reduce exports.

It should be noted that it is not the intention of this revised Plan to nominate specific technologies to be employed for treating specific wastes. Specific technologies are however identified and discussed in this chapter. The promotion of some technologies (namely combustion in cement kilns and landfill (of certain wastes where no other option is available)) should be facilitated in the interest of reducing exports by using existing infrastructure, provided they can be correctly operated to protect human health and the environment. However, more than one treatment option is usually available for a given waste stream, and no realistic proposal for hazardous waste treatment in Ireland should be excluded on foot of this revised Plan. Any proposal will of course require a waste licence or permit before operations can begin, and this will ensure that operational facilities operate in a manner that represents BAT[86] and will not cause environmental pollution. Preparation of regional waste management plans should consider treatment options that are highlighted in this Plan and take measures to plan for such treatment, where considered strategically advisable, and economically and technically feasible, in order to help improve Ireland's self-sufficiency in hazardous waste treatment.

6.1 The current situation

Almost half (47%) of Irish hazardous waste (not including contaminated soil) was exported for treatment abroad in 2011. Some 22% was treated on-site of generation, for the most part at IPPC-licensed facilities. The remaining 31% was treated at authorised hazardous waste facilities in Ireland. Figure 1 shows the trend in the location of hazardous waste treatment since 2006. The figure shows no significant change in the volumes treated on site of generation at commercial facilities in Ireland over the years. Export trends show an overall increase in hazardous waste treatment.

Table 19 shows the headline treatment techniques used for Irish hazardous waste – both in Ireland and abroad for the years 2008 and 2011. The data show that thermal treatment technologies, incineration and use as fuel, dominate the export column. Solvent recycling is also important, as is metal recovery.

84 "Treatment" means recovery or disposal operations, including preparation prior to recovery or disposal (EU Waste Framework Directive 2008/98/EC).

85 Please refer to Article 16 of EU Waste Framework Directive 2008/98/EC.

86 BAT means "best available technique" and forms the basis for EPA licensing of facilities. Techniques or technologies must meet BAT criteria published periodically by the EPA.

Table 19 Comparison of treatment technologies employed for Irish hazardous waste

Hazardous waste treatment category or technology[87]	2008		2011	
	Treated in Ireland (t)	Treated abroad (t)	Treated in Ireland (t)	Treated abroad (t)
Incineration (D10)	20,897 on-site	40,505	12,615 on-site	35,569
Use as fuel (R1)	12,312 on-site 23,986 off-site	21,714	11,012 on-site	28,182
Solvent recycling (R2)	23,506 on-site 7,374 off-site	33,078	21,770 on-site 27,978 off-site	19,746
Metal recovery (R4)	1,727 off-site	23,760	369 off-site	28,702
Physico-chemical treatment (D9)	322 on-site 27,131 off-site	1,792	122 on-site 25,929 off-site	966
Landfill (D1, D5)	12,559 on-site 7,462 off-site	21,992	20,079 on-site	7,975
Inorganic material recovery (R5)	6,030 off-site	2,596	5,842 off-site	4,426
Acid/base regeneration (R6)	0	1,543	0	1,014
Organic substance recovery (non-solvent) (R3)	379 on-site 13,562 off-site	6,618	294 on-site 61 off-site	8,187
Oil recovery (R9)	250 on-site 26,566 off-site	0	180 on-site 34,127 off-site	233
Other (e.g., D8, D13/R12)	1,813 on-site	3,609	1,700 on-site 4,531 off-site	14,037
Totals	72,038 on-site 113,839 off-site		67,772 on-site 98,838 off-site	
	185,877 total	**157,207**	**166,610 total**	**149,037**
	343,084		**315,647**	

Table 20 builds on this data and provides an overview of the principal waste types exported for the various treatment options. It is likely that some hazardous waste that is exported could be treated, or at least pre-treated, at existing indigenous facilities – for example solvents, electrical equipment, photochemicals, acid/alkali waste (subject to licence and waste acceptance restrictions at existing facilities). Increasing quantities of Irish waste are exported for use as fuel. This predominantly means the combustion of waste solvent in cement kilns or other combustion plant. Cement kilns currently in operation in the Republic of Ireland (4) and Northern Ireland (2) could potentially use certain hazardous wastes as a fuel substitute for fossil fuels. One kiln has recently commenced using solvent wastes for this purpose, having had its IPPC licence amended to permit the change. Not all operations would necessarily be suitable or available to use waste as fuel.

87 Refer to Annexes I and II of EU Waste Framework Directive 2008/98/EC for disposal and recovery operations.

Table 20 List of dominant waste streams exported for various treatment techniques

Hazardous waste treatment category or technology	2009	2010	2011
	Principal waste types exported	Principal waste types exported	Principal waste types exported
Incineration (D10)	Aqueous washing liquids and mother liquors (29%)	Chemical waste (20%)	Aqueous washing liquids and mother liquors (12%)
	Solvents (20%)	Aqueous washing liquids and mother liquors (33%)	Solvents (25%)
	Halogenated solvents (12%)	Solvents (20%)	Halogenated solvents (13%)
	Other industrial waste (21%) [1]	Solid wastes containing dangerous substances (11%)	Other industrial waste (21%)
		Paint, Ink & Varnish (5%)	Solid wastes containing dangerous substances (13%)
	Chemical waste (22%)	Packaging (contaminates 2%)	Chemical waste (22%)
Use as fuel (R1)	Solvents (98%)	Solvents (86%)	Solvents (81%)
	Other industrial waste (2%)	Aqueous washing liquids and mother liquors (8%)	Aqueous washing liquids and mother liquors (13%)
		Paint, ink, varnish waste (4%)	
Solvent recycling (R2)	Solvents (95%)	Solvents (93%)	Solvents (95%)
	Paint, ink and varnish (1%)	Halogenated solvents (6%)	Halogenated solvents (5%)
	Other industrial waste (1%)		
Metal recovery (R4)	Batteries (63%)	Batteries (lead-acid, vehicle 59%)	Batteries (lead-acid, vehicle 52%)
	Other industrial waste (6%)	Equipment (electrical, electronic, mechanical 29%)	Other industrial waste (4%)
	Equipment (electrical, electronic, mechanical 28%)	Chemical waste (2%)	Equipment (electrical, electronic, mechanical 37%)
		Sludges and filter cakes (3%)	

cont'd

cont'd

Hazardous waste treatment category or technology	2009	2010	2011
	Principal waste types exported	Principal waste types exported	Principal waste types exported
Physico-chemical treatment (D9)	Acid / Alkali waste (47%)	Sludges and filter cakes (51%)	Sludges and filter cakes (43%)
	Paint, ink & varnish (32%)	Paint, ink & varnish (32%)	Thermal treatment and combustion residues (22%)
	Other industrial waste (12%)	Acids and alkaline waste (11%)	Acids and alkaline waste (16%)
			Absorbents, wiping cloths etc. (12%)
Landfill (D1, D5)	Asbestos (93%)	Asbestos (99%)	Asbestos (76%)
	Sludges and filter cakes (6%)	Construction and demolition waste (<1%)	Other industrial waste (11%)
Inorganic material recovery (R5)	Equipment (electrical, electronic, mechanical 33%)	Equipment (electrical, electronic, mechanical 31%)	Thermal treatment and combustion residues (39%)
	Construction and demolition waste (27%)	Other industrial waste (27%)	Equipment (electrical, electronic, mechanical 29%)
	Other industrial waste (29%)	Construction and Demolition waste (26%)	Other industrial waste (16%)
		Sludges and filter cakes (12%)	Batteries (lead acid, 11%)
Acid/base regeneration (R6)	Acid and alkali waste (100%)	Acid and alkali waste (87%)	Acid and alkali waste (87%)
		Chemical waste (8%)	Chemical waste (13%)
Organic substance recovery (R3)	Construction and demolition waste (77%)	Construction and demolition waste (99%)	Construction and demolition waste (74%)
	Paint, ink & varnish (10%)		Equipment (electrical, electronic, mechanical 18%)
	Equipment (electrical, electronic, mechanical 9%)		Solvents (4%)

[1] This is principally process waste from the pharmachem sector.

6.1.1 Hazardous Waste Projections

In terms of projections of hazardous waste generation, Curtis *et al* (2009)[88] provide a summary of ISus baseline scenario projections for waste generation including for hazardous waste generation. Projections up to 2025-2030 for hazardous waste generation are presented in Table 21. The study indicates that with a projection of increased levels of hazardous waste in the future the sustainability associated with shipping these materials abroad for treatment needs to be reassessed.

Table 21 Waste arisings as observed and projected for hazardous waste

2010	2010-2015	2015-2020	2020-2025	2025-2030	2010-2015	2015-2020	2020-2025	2025-2030
Baseline projection					**Baseline projection**			
Million tonnes per year					Change per year, %			
0.29	0.32	0.43	0.53	0.62	6.6	5	3.3	3.3

6.2 Self-sufficiency versus export of hazardous waste

The data above show that significant quantities of hazardous waste are exported for treatment to other European countries. Broadly speaking, this export of waste takes place in a currently stable marketplace. Article 16 (1) of the Waste Framework Directive (2008/98/EC) states that:

> "Member States shall take appropriate measures, in cooperation with other Member States where this is necessary or advisable, to establish an integrated and adequate network of waste disposal installations…taking into account best available techniques."

Given this principle established in European law, and considering the data presented in Section 6.1, it is recommended that Ireland should strive for greater self-sufficiency in hazardous waste management where it is strategically advisable and where it is technically[89] and economically[90] feasible.

This recommendation is in line with several objectives. It recognises the proximity principle established in the Waste Framework Directive (see above) and it seeks to maximise the re-use and recovery potential of, for example, materials, precious metal and secondary fuels, through provision of a range of local treatment options where practical. There are ancillary environmental benefits deriving from self-sufficiency. Firstly international transport of hazardous waste is minimised (eliminating associated risks, and avoiding transport related greenhouse gas emissions). Secondly, it increases availability of recovery and disposal outlets for hazardous waste if problems arise in the export agreements for hazardous treatment in other Member States. However, it is recognised that hazardous waste destined for recovery is subject to an open and competitive waste market in the EU, and Ireland is also unlikely to achieve complete self-sufficiency given the range of specialist treatments that are required for certain hazardous waste streams. Indeed, Article 16 (4) of the Waste Framework Directive (2008/98) states that:

88 Curtis, J., Pentecost, A., Lyons, S., Morgenroth, E., di Cosmo, V. (2009) Towards a Green Net National Product for Ireland. STRIVE Report Series No.103

89 Technical feasibility means that a project must be able to obtain a waste licence and other relevant authorisations to proceed. It must therefore meet or exceed BAT (best available technique) and must be efficacious in the treatment of waste while not causing environmental pollution.

90 Economic feasibility means that a project must provide an economic return.

> "The principles of proximity and self-sufficiency shall not mean that each Member State has to possess the full range of final recovery facilities within that Member State"

Policies of enforced self-sufficiency have been abandoned in other Member States as a result of pressures exerted by the open and competitive waste market in the European Union. The recommendation to strive for greater self-sufficiency is intended to maximise the treatment and disposal of hazardous waste in Ireland, where strategically advisable, and economically and technically feasible, with policy, environmental and availability-of-outlet benefits.

The export of some major categories of hazardous waste decreased in 2011 compared to 2009, as shown in Figure 9. There was no significant change in the export of waste solvents from 2009 to 2011. Nevertheless, there are options for the treatment of waste solvents in Ireland that are further explored below. The decline in the reported export of asbestos waste is particularly notable. Exports decreased by approximately 50% from a total of 14,068 tonnes in 2009 to 7,001 tonnes in 2011. This reduction may be due to a decline in construction and demolition (C&D) activities. Similarly the reported export of C&D waste reduced from 12,892 tonnes in 2009 to 3,236 tonnes in 2011. There was a significant increase in the export of batteries (lead acid) from 11,832 tonnes in 2009 to 15,374 tonnes in 2011.

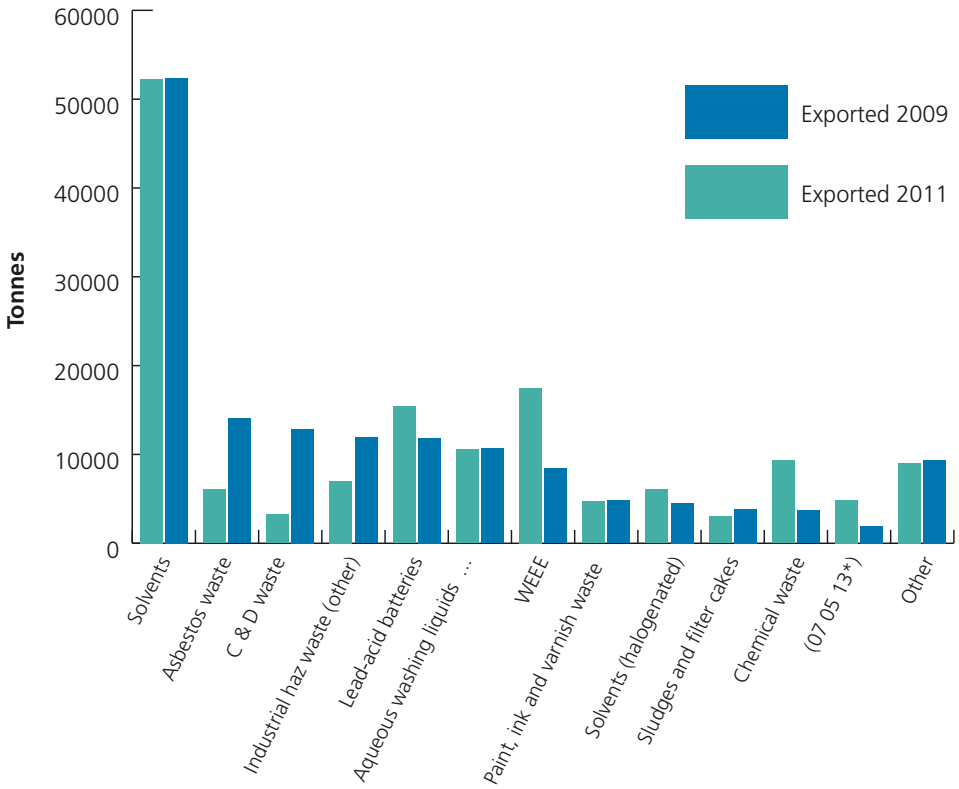

Figure 9 Export of some major hazardous waste streams, 2009 and 2011

Based on the data presented in this chapter and in Chapter 3, three overarching strategic needs have been identified for action if additional hazardous waste is to be treated in Ireland and export is to be reduced:

- expansion of recovery and treatment capacity in Ireland for waste that does not need thermal treatment or landfill – generally referred to as physico-chemical treatment – see Section 6.6;
- addressing the deficit in thermal treatment capacity in Ireland (i.e. use as fuel, co-incineration or incineration) for Irish hazardous waste currently being exported (e.g. solvents) – see Section 6.4; and
- securing of long-term disposal arrangements for hazardous waste streams not suitable for thermal treatment or recovery.

It should be clearly understood that while this revised Plan can set out options and make recommendations, based on waste data and environmental criteria, and on the need for treatment facilities for hazardous waste (for the purpose of reducing export of hazardous waste), infrastructure is however provided by private organisations or through public private partnerships. Consideration should be given to co-location of hazardous waste treatment at existing waste facilities or brownfield sites for the purposes of sustainability and land-use planning. Any proposals for hazardous waste treatment will of course be subject to their own planning and licensing/permitting processes including the assessment of environmental impacts.

In order to facilitate an on-going understanding of hazardous waste treatment capacity needs, the EPA will prepare and maintain, in consultation with various stakeholders an inventory of national hazardous waste recovery and disposal capacity.

6.3 Options proposed as alternative treatment techniques

A number of alternative treatment methods are available for several different hazardous waste streams, including such techniques as:

- alkaline hydrolysis
- ball milling
- base catalysed dechlorination
- catalytic treatment
- 'Cerox'
- gasification
- gas-phase chemical reduction
- molten metal
- molten salt
- advanced oxidation
- molten slag
- 'PCB Gone'
- plasma arc technologies
- 'Silver II'
- solvated electron technology
- steam detoxification
- supercritical water oxidation
- thermal desorption

A brief technical description of these technologies is provided in Appendix D. There are clear possibilities for the use of some of these technologies for the treatment of hazardous waste in Ireland. The revised Plan supports the provision of such technologies where technically and economically feasible. Some of these alternatives are niche-market treatment options (often for such wastes as persistent organic pollutants or chlorinated chemicals). Some are in development or have not yet been commercially proven. In many cases, their application is technically limited and adequate supplies of waste would be needed to justify investment. To help the development of realistic alternatives, the revised Plan continues to support the following:

- research grants should be made available, where possible, through the EPA research programme, or from other suitable sources, to develop hazardous waste and waste treatment technologies from conceptual to laboratory and pilot scales; and
- supports, where possible, should be available for the commercial development of treatment capacity.

Any proposals for alternative technologies would need to be evaluated on the basis of BAT. The potential for increased import of hazardous waste into Ireland to supply alternative or niche processes should be addressed by policy-makers if the need arises, taking into account BAT and potential impacts on the environment and human health.

As alternative treatment techniques are commercially established, training and up-skilling of regulators should be supported with the assistance of industry and associated research institutes (e.g. via Continuous Professional Development).

6.4 Management of solvents and other wastes currently exported for thermal treatment

For several categories of hazardous waste, thermal treatment (whether in a dedicated incinerator or in a cement kiln) is a commonly used treatment technology. Some relevant data are summarised in Table 22. The locations of treatment (on-site, off-site or abroad) for some categories of hazardous waste are shown against the relevant treatment classification used. Data on use as fuel (R1) and incineration (D10) are shown. For the purposes of comparison, solvent recycling (R2) is also shown.

Table 22 shows that a total of 66,973 tonnes of hazardous waste was exported for thermal treatment (use as fuel and incineration) in 2011. Some 35,568 tonnes was exported for incineration and 31,405 tonnes for use as fuel. There is a considerable increase in waste exported for use of fuel since 2010, when a total 17,334 tonnes was exported for similar treatment. There was a significant decrease in the on-site incineration of hazardous waste when comparing 2011 to 2009 figures. There has been a decrease in the treatment of "other" industrial hazardous waste, comprising aqueous-based and solid wastes. All of these wastes are generated predominantly by the pharmachem sector. The revised Plan period should see waste prevention from the pharmaceutical industry mainly as a result of the increased use of water-based biotechnology in drug manufacture and reduced step/continuous loop processes underpinned by economic incentives.

It is a recommended objective of this revised Plan to reduce export and increase indigenous (including on-site) treatment of hazardous waste, where strategically/environmentally advisable, and economically and technically feasible. To achieve this objective, capacity is required in accordance with the waste hierarchy for solvent treatment in Ireland - solvent recycling (R2), use instead of fossil fuel at existing appropriate sites (e.g. at existing pharmachem facilities, in existing cement kilns) (R1), in purpose built incinerators (D10), and/or alternatives (as outlined in Section 6.3) as appropriate. Domestic capacity could be provided in either of two locations: on-site of generation, or off-site at commercial facilities in Ireland.

Table 22 Thermal treatment of waste solvents and other hazardous waste, 2009-2011

	2009			2010			2011		
	On-site	**Off-site**	**Export**	**On-site**	**Off-site**	**Export**	**On-site**	**Off-site**	**Export**
Solvents (total shown, including halogenated solvents where these were specified)									
Recycling (R2)[91]	25,042	18,533	22,047	27,352	20,359	20,387	21,770	16,688	19,613
Use as fuel (R1)	7,326	17,745	23,171	7,490	0	12,607	6,292	0	22,746
Incineration (D10)	19,306	0	10,904	17,896	0	6,409	12,091	0	13,736
Other industrial hazardous waste (mostly pharmachem sector – aqueous mother liquors, reaction residues, solid wastes – often containing solvents but not as a principal constituent)									
Use as fuel (R1)	3,273	0	586	4,159	0	237	4,720	0	458
Incineration (D10)	3	0	7,274	3,917	0	734	2	0	1,262
Chemical waste not otherwise specified (mostly organic and inorganic chemicals 16 05 07* and 16 05 08*)									
Use as fuel (R1)	0	0	2,250	0	0	182	0	0	141
Incineration (D10)	0	0	773	0	0	6,576	0	0	7,670
All others (mostly waste oil, waste paint, absorbents and filter materials and contaminated packaging)									
Use as fuel (R1)	0	0	5,341	0	0	4,308	0	0	8,060
Incineration (D10)	2,069	0	15,131	338	0	18,682	521	0	12,900
Sub-total - Use as fuel (R1)	10,599	17,745	31,348	11,649	0	17,334	11,012	0	31,405
Sub-total Incineration (D10)	21,378	0	34,082	22,151	0	32,401	12,614	0	35,568
Total (t)	**31,977**	**17,745**	**65,430**	**33,800**	**0**	**49,735**	**23,626**	**0**	**66,973**

(Note: Data extrapolated/estimated from National Waste Reports and associated data)

91 Solvent recycling (R2) is presented in this table not as a thermal treatment technique, but to illustrate the scale of solvent recycling vis-à-vis thermal treatment (R1 + D10). (Note: R1 means use as fuel, i.e. recovery of heat/energy; R2 means material recycling, e.g. by distillation; D10 means incineration).

With regard to o*n-site* treatment of solvents, in 2011, fifteen IPPC-licensed companies employed solvent distillation (to recycle solvents back into a process stream) or thermal treatment (to use as fuel or dispose of solvent) – see Appendix B (Table 30). It is recommended that further opportunities for on-site treatment of waste, particularly in the EPA licensed sector, be explored and that relevant EPA licensed companies examine their processes for the potential to incorporate on-site solvent treatment techniques. The promotion of this activity should be undertaken in parallel with the prevention initiatives proposed for the pharmaceutical and chemical sector in Chapter 4.

For solvent waste that is transported *off-site*, there are two options: treatment in Ireland or treatment abroad. A single waste treatment company, Soltec, is authorised to accept waste solvents for recycling by distillation. One cement plant is licensed to burn solvent with an annual permitted capacity of 10,000 tonnes. Two facilities, Indaver Ireland, and Veolia Environmental Technical Solutions Ltd., blend waste solvents to optimise their calorific value for subsequent use as fuel. The blended waste solvents are currently transported abroad to cement kilns.

Overall, 36,482 tonnes of waste solvent was exported for incineration or use as fuel in 2011. This was an increase from 34,075 tonnes in 2009. There is clearly a quantity of solvent waste that could be treated commercially in Ireland. Subject to the application of the waste hierarchy, the options to achieve this are as follows:

- recycling – i.e. distillation or other physico-chemical treatment resulting in a recycled solvent suitable for re-use;
- co-incineration and energy recovery in cement kilns or electricity/heat generation facilities; and
- incineration – i.e. combustion in dedicated incineration plant with recovery of energy.

The order of their presentation reflects the accepted waste hierarchy, namely that preference should be given to recycling, recovery, and treating waste for disposal as close as possible to its place of generation. The current use of the three options is reflected in Table 22.

Domestic solvent waste contractors generally operate a similar triage hierarchy for waste solvents. Subject to the application of the waste hierarchy, waste solvent is directed to the most suitable treatment option – recycling, use as fuel or incineration – depending on such factors as the nature of the solvent, its level of contamination, the client's requirements and relative costs. Waste solvents that are unsuitable for either recycling or use as fuel are sent for incineration. It is noted that elements of all three of these treatment options are in place in Ireland, as outlined above: (1) Considerable solvent recycling is carried out at industrial facilities and at one commercial facility which are EPA licensed. (2) Major solvent transfer facilities in Ireland are now equipped with solvent blending equipment. When waste solvents are suitable for blending and for subsequent use as fuel in cement kilns, then they are directed to this route, where the outlets are available. (3) On-site incineration is carried out at some EPA licensed sites, and there remains a proposal for a hazardous waste incinerator at Ringaskiddy, Co. Cork.

Recycling

Authorised capacity for the recycling of solvents by distillation at one commercial facility[92] (off-site of generation) is 5,000 tonnes per annum, though less than 600 tonnes was treated in 2011. There may be barriers to the economic feasibility of large-scale distillation or recycling of solvents in Ireland. The principal barrier is the apparent limited market for recycled solvent in Ireland. Recycled solvent would thus have to be exported to gain critical scale, probably to the United Kingdom. Given also that several large-scale solvent recyclers already operate in Great Britain, investment in a new substantial recycling facility in Ireland may be unattractive. Environmentally, the location of solvent recycling is neutral in its effect. There is little difference between recycling solvent in Ireland and exporting the recycled solvent on the one hand, and exporting waste solvent for recycling abroad on the other. The transport distances remain substantially the same. An Economic Study of Solvent Recycling & Treatment in Ireland was completed in 2010[93]. The results of this study should help inform decision-makers as to whether expansion of the commercial solvent recycling industry in Ireland should be actively promoted and supported. Such promotion and support would require parallel efforts to market recycled solvent in Ireland, and the assistance of the North/South Market Development Group may be appropriate in this regard. It should be noted, however, that a solvent recycling industry in Ireland is likely to remain a niche market and account for a relatively small proportion of solvent waste arisings.

Co-incineration

The total operational blending capacity in Ireland is reported to be 66,000 tonnes per annum though not all of this capacity is currently used. It is mainly exported, however, one cement plant was granted an IPPC licence in 2012 to co-incinerate a number of waste types including solvents at the plant.

In the interest of promoting self-sufficiency and maximising fossil fuel substitution, it is recommended that the combustion of blended solvent should be facilitated in Ireland, within the constraints of planning requirements and EPA licensing, in preference to export. Indigenous cement kilns may be suitable users of blended solvent, although power stations or other combustion plant may also be appropriate.

Incineration

Co-incineration of waste solvent cannot provide the whole solution to managing Irish waste solvents or other waste streams suitable for or requiring thermal treatment. Co-incineration plants will only, justifiably, seek to burn the best material with the optimal calorific value. The remaining wastes (see Table 22), plus solvent waste unsuitable for blending and co-incineration, will still require an alternative treatment. The most widely used alternative for these wastes is currently incineration in dedicated facilities.

Incineration is a thermal treatment technology that provides flexibility in the management of combustible hazardous waste. A wide range of hazardous wastes can be accepted – not only solvents, but also other liquid and solid hazardous wastes such as those listed in Chapter 3 and summarised in Table 22.

Table 23 calculates the approximate quantity of hazardous waste that would still have been exported for incineration in a given year even if all potentially recyclable waste solvent was to be diverted to recycling or for use as fuel. The calculation is based on the *total* quantity of hazardous waste that is exported for incineration (D10) minus the quantity of *solvents* that are exported for incineration

92 Soltec, waste licence register number W0115-01.

93 Available at http://www.epa.ie/pubs/reports/waste/haz/Solvents%20Economic%20Study%20Report.pdf

(D10). Table 23 shows that even with full diversion of all available waste solvent to recycling facilities and for use as fuel, a remaining 21,832 tonnes of hazardous waste would still have been exported for incineration in 2011. The equivalent calculations for 2009 and 2010 show some variability in the quantity of waste potentially available for or requiring incineration after all possible recycling of solvent or use of solvent as fuel has taken place.

Table 23 Calculation of quantity of hazardous waste potentially available for incineration in Ireland

	2009 (t)	2010 (t)	2011 (t)
Total quantity of hazardous waste exported for incineration (D10)	34,082	32,401	35,568
Deduct the actual quantity of solvent exported for incineration (D10) that may have the potential to be diverted for recycling or use as fuel	-10, 904	-6,409	-13, 736
Minimum potentially available for incineration in Ireland that is currently incinerated abroad	**23, 178**	**25,992**	**21, 832**

Obviously it is difficult to predict how much hazardous waste will remain after, and even if, all suitable material is diverted for recycling and use as a fuel. However, it is clear that diverting less solvent to recycling or for use as fuel in cement kilns or other combustion plant would leave greater quantities sent for incineration, whether in Ireland or abroad. It should be noted that the export of this material is currently taking place in a secure, competitive and available marketplace abroad. Irish waste is not likely to be restricted from entering other Member States, although there are some policy barriers that exist (e.g. UK disposal market[94]). It is therefore a matter for the private sector to judge whether investment in an Irish hazardous waste incineration facility, or alternative treatment technologies, would make commercial sense in the context of the evolving European market.

It is, however, evident from this analysis that there is a quantity of hazardous waste that is currently exported for incineration for which incineration will remain the most likely management route. It must therefore be concluded that, in combination with the blending of waste solvent for use in cement kilns, and in the absence of alternative techniques that are capable of treating a wide range of diverse waste streams, incineration will be needed in order for Ireland to move towards self-sufficiency in the treatment of hazardous waste.

The proposed incineration facility for Ringaskiddy[95] is authorised to treat up to 50,000 tonnes of hazardous waste per annum. It is noted that a merchant incinerator operator has submitted an application in 2012 to the EPA for a waste licence review to increase the capacity of their waste-to energy plant from 200,000 tonnes per annum to 220,000 tonnes per annum and, in particular, to accept up to 15,000 tonnes per annum of a number of hazardous waste types (e.g. paint tins, rags and wipes contaminated with paints or oils) for treatment. This application is subject to a full environmental assessment and industrial emissions licence determination process.

94 The *UK Plan for Shipments of Waste* prohibits most imports of waste for disposal from Ireland into Great Britain, but allows for certain hazardous waste imports for disposal into Northern Ireland (and exports from Northern Ireland). There are no restrictions on access to recovery or recycling markets. See Section 6.9 below.

95 Waste licence register number W0186-01.

6.5 Landfill of hazardous waste

Ireland currently has no dedicated hazardous waste landfill disposal facility. Table 24 shows the scale of landfilling abroad of Irish hazardous waste in 2011. Asbestos is the single largest hazardous waste stream that requires landfill disposal.

Table 24 also outlines the use of landfill for Irish hazardous waste abroad for the year 2010 and based on both 2010 and 2011 figures indicates a current need for approximately 10,000-15,000 tonnes of capacity per annum.

Table 24 Commercial landfilling of Irish hazardous waste (exported), 2010-2011

	2010 (t)	2011 (t)
Asbestos	9,512	7,001
Hazardous construction and demolition waste	54	26
Solid wastes containing dangerous substances	2	2
Other industrial hazardous waste	-	865
Sludges and filter cakes	-	39
Metals and heavy metal containing wastes	19	41
Contaminated soil	216	5,098
Total	9,803	13,073
Total off-site landfill excluding contaminated soil	**9,587**	**7,975**

The landfilling of asbestos is subject to a unique set of criteria. As a "stabilised non-reactive hazardous waste", construction materials containing asbestos (EWC 17 06 05*) and other suitable asbestos waste may be accepted at non-hazardous landfills, subject to a set of strict waste acceptance and waste management criteria being followed[96]. For example, asbestos must be landfilled alone and separate to the main body of non-hazardous waste, and it must be clearly marked on all site maps. A number of licences were previously reviewed to allow asbestos to be accepted for disposal. However, there is no facility currently operational for the acceptance of asbestos for disposal in Ireland.

The cost of exporting asbestos waste is prohibitive, particularly for small scale or DIY operators. This is in all likelihood driving asbestos towards being unreported or illegally disposed. The generation of asbestos is a legacy of construction materials used in the past and is linked to the rate of renovation, demolition or extraction of asbestos from older buildings. The quantities shown in Table 24 represent the current requirement for landfill capacity for *reported* asbestos waste. It is proposed that, in the absence of a dedicated national facility and considering the prohibitive export costs for this stream, additional capacity be provided at specialist cells in a limited number of existing non-hazardous landfills

96 As set out in article 6(c)(iii) of the Landfill Directive (1999/31/EC) and section 2.3.3 of the Annex to Council Decision 2003/33/EC.

to prevent illegal disposal of asbestos and to take account of increased promotion of legal collections of asbestos[97]. Thus capacity for up to 20,000 tonnes of asbestos waste per annum is recommended for capacity planning purposes.

Other than asbestos, a relatively small amount of hazardous waste (other than contaminated soil) required disposal – approximately 75 tonnes in 2010 and 973 tonnes in 2011.

While landfill is the least favoured option on the waste hierarchy, it is recognised that for some non-recoverable or non-combustible hazardous wastes it will need to be considered. Relying on the current export model to address this need poses risks for long term availability of outlets. However, there are considerable hurdles to be overcome prior to development of a hazardous waste landfill, from a societal acceptance, regulatory and financial (liability) point of view. These hurdles should not be underestimated when developing plans that may include the need for such infrastructure. These hurdles must be weighed up against the uncertainty in the volumes of waste that are subject to landfill as the only option. Where brownfield sites such as existing landfills are proposed for co-location of difficult wastes such as asbestos some of these obstacles may be more easily overcome.

In July 2010, a study on the Technical and Economic Aspects of developing a National Difficult Waste Facility (NaDWaF) was completed by SKM Enviros on behalf of the EPA[98]. This study looked at a range of hazardous and difficult wastes (which because of their nature and physical properties pose problems for disposal) including out of date unexploded marine distress flares and unused ordnance as well as radioactive sources. A range of management options were examined including landfill technical containment and operational requirements. Site selection criteria, potential for co-location, all-island perspectives and environmental issues arising were examined, and an economic appraisal and a socio-economic assessment were also conducted.

This study projected growth tonnages for hazardous waste arisings potentially suitable for landfill in Ireland and Northern Ireland and are aggregated on 6 year basis, 2008 – 2025, (including hazardous contaminated soils).

97 In Chapter 5, a network of asbestos transfer stations operating from civic amenity sites is proposed. The availability of drop-off facilities at equitable cost should minimise the illegal disposal or backyard accumulation of asbestos.

98 Report is available at *http://www.epa.ie/pubs/reports/waste/haz/nationaldifficultwastefacilitystudy.html*

Table 25 Hazardous Waste Arisings Potentially Suitable for Landfill, Ireland and Northern Ireland, Aggregated on 6-year basis, 2008-2025 (as outlined in NaDWaF study).

HAZARDOUS WASTE[99], LANDFILLED Unit: tonnes	NACE	2008 - 2013 Average	2014 - 2019 Average	2020 - 2025 Average
Chemical production				
07 05 11*	24	89	141	182
07 05 13*		156	246	318
16 11 05*		6	9	12
Non-metallic mineral production				
10 11 13*	26	36	50	60
10 11 19*		1,527	2,131	2,524
12 01 14*		12	17	20
Metal prod. excl. machinery & transport equip.				
01 03 07*	27-28	14,190	22,414	28,946
10 02 07*		43	68	88
10 10 07*		826	1,305	1,685
Electrical goods				
06 04 05*	31-33	2,845	4,494	5,804
Construction				
17 05 03*	45	142,642	179,121	195,723
17 06 01*		2,841	3,567	3,898
17 06 05*		11,882	14,921	16,304
17 09 03*		11	14	16
Services (excl. transport)				
19 01 05*	50-55, 64-95	8	10	11
19 01 13*		29, 000	35,900	35, 900
19 03 04*		27	33	39
19 03 06*		1,124	1,373	1,621
19 08 06*		3	4	4
19 10 03*		9,266	11,321	13,371

cont'd

99 Refer to European Waste Catalogue for waste description (e.g. 17 05 03* *refers to soil and stones containing dangerous substances*)

cont'd

HAZARDOUS WASTE[99], LANDFILLED Unit: tonnes	NACE	2008 - 2013 Average	2014 - 2019 Average	2020 - 2025 Average
Predictions Model Sub-Total (Applying ESRI Growth Factors)		216, 534	277, 139	306, 526

It is noted that an application for a licence review has been submitted to the EPA, which includes the development of a hazardous waste facility for the engineered landfill of contaminated soil and fly-ash containing dangerous substances (the application does not include asbestos disposal). This application is subject to a full environmental assessment and industrial emissions licence determination process.

This revised Plan recommends that the DECLG keep under review the provision of hazardous waste treatment capacity (e.g. hazardous waste landfill capacity), including at national or all-island level, taking into account the above information including the findings from the NaDWaF study, and consider the use of appropriate economic or other instruments to ensure any necessary capacity is provided for disposal, either by the private or public sector.

Such instruments might include:

- policy directions or incentives for existing local authority or private sector landfill operators;
- a national contract or public private partnership; and/or
- an export levy.

Such instruments may provide additional incentive to potential investors in establishing the necessary infrastructure for the treatment of hazardous waste. National policy or guidance to direct the control of hazardous waste shipments (e.g. for disposal) should be developed in order to facilitate self-sufficiency in hazardous waste treatment where this is technically, economically, strategically and environmentally advisable.

6.6 Physico-chemical treatment

Physico-chemical treatment is used to treat hazardous liquid, solid and sludge waste. The principal physico-chemical treatment[100] operations are material conversion (e.g. neutralisation, oxidation and reduction) and material separation (e.g. filtration, sedimentation, distillation and ion exchange). Physico-chemical treatment plants can use many processes, some processes being common to several treatments. Physico-chemical processes are a useful way of concentrating certain hazardous wastes or transforming them into less problematic compounds (for further disposal or recycling).

A total of 25,959 tonnes of hazardous waste was treated off-site in Ireland in 2011 by physico-chemical methods (in its strictest interpretation as disposal operation D9) at four facilities. In a broader interpretation, all hazardous waste treatment facilities strictly speaking carry out "physico-chemical" treatment processes in the sense that a waste is subjected to physical or chemical treatment processes to concentrate or recover materials. These operations tend however to be classified according to recovery codes (see Appendix B). An additional 966 tonnes was exported for disposal by physico-chemical treatment. There are no major technical barriers for Irish facilities to increase their capacities or

100 The classification of "physico-chemical treatment" in the legislation as a disposal option is unhelpful. Many treatment methods that are physical or chemical in nature actually result in waste being recycled – and many waste operators describe their activities in this manner and take little cognisance of the fact that it is a disposal code. Thus physico-chemical treatment will be discussed here as a catch-all classification for a range of disposal and recycling techniques, including, for example: chemical neutralisation, mechanical material separation, solvent distillation and recycling (of metal, organic or inorganic constituents).

to expand their processes to treat a wider range of waste streams. Some facilities are actually operating below authorised and equipment capacity levels. However, there are other barriers to expansion: in the form of low waste generation or poor collection rates (to justify investment) and lack of disposal facilities for treatment residues. Much of the exported waste is sent to large-scale specialised physico-chemical treatment centres in Germany and other countries. Smaller-scale Irish facilities could find it difficult to compete on many waste streams with these larger continental operations.

There are several benefits to promoting increased physico-chemical treatment of hazardous waste in Ireland. It is a relatively low cost (capital and operating) method of dealing with certain hazardous wastes. Pre-treating or concentrating waste can reduce subsequent transport costs[101]. New or expanded processes could provide employment and investment in companies operating in Ireland and could contribute towards the creation of recycling markets in Ireland. Given that the barriers are less technical and more economic in nature, the role of business development supports become important. Considerable business supports are available from Enterprise Ireland (see Section 6.8) and county and city enterprise boards (*www.enterpriseboards.ie*). It is important that the waste industry, particularly small businesses, be actively supported by enterprise agencies to ensure it is in a position to exploit opportunities to expand its treatment base and create new investment and employment. Provision of capacity for the pre-treatment of the following hazardous waste streams is particularly recommended (though business supports from enterprise agencies should not necessarily be confined to this non-exhaustive list of wastes):

- paint and varnish waste – though not always hazardous waste, it is often mixed and difficult to segregate;
- waste electrical and electronic equipment – preparation for re-use, dismantling and recycling industries in Ireland should be allowed to continue their development and should be supported, where possible;
- end-of-life vehicles – end-of-life vehicles regulations place obligations on producers (manufacturers and importers) to establish and maintain a national collection system to facilitate the recovery and treatment of end-of-life vehicles. The regulations also impose an obligation on registered vehicle owners who intend to discard their vehicle as waste to deposit it at an authorised treatment facility ensuring that depollution is carried out in an environmentally sound manner;
- oil filters – though often pre-treated (by separating oil, metal and other materials) when they are collected, collection rates need to improve and greater capacity for their pre-treatment is recommended;
- lead acid batteries (automotive and industrial) – large volumes of acid are exported with batteries, adding to export weights and transport costs. The feasibility of draining batteries and neutralising or recycling acid in Ireland should be explored, with consideration for the separation of lead, other metals and plastic prior to recycling;
- acid and alkali waste – large quantities are exported. Existing treatment capacity is small scale and there is probably scope for expansion. The feasibility of expanding treatment of this stream should be explored.

101 For example, dismantling of WEEE and fluorescent lamps achieves this objective. Likewise, the separation of waste paint from its containers and their squashing or shredding will reduce the amount of empty space in shipping containers. Lead acid batteries are another example of this potential.

6.7 Difficult wastes

The term "difficult wastes" is commonly used to refer to wastes that by their nature and physical properties pose problems for disposal and require special management to avoid nuisance and pollution or where physical properties of the wastes create serious handling problems. These wastes may or may not be hazardous. Wastes can also be considered difficult if there is no available treatment technology to allow it to meet waste acceptance criteria limits or if the technology has not yet been commercially proven. Difficult wastes include:

- out of date ordnance;
- marine flares;
- non-re-saleable seized/confiscated controlled substances;
- ship and cargo wastes;
- noxious weeds; and
- contaminated dredging spoils and harbour wastes.

The above-mentioned NaDWaF study also looked at management options for the above difficult wastes and found that in most cases, such wastes would not require management via a hazardous waste landfill facility. The study did however point out that a key waste arising requiring the introduction of a co-ordinated management policy are marine flares or time expired pyrotechnics (TEPs). The actual arisings are not definitively known and there is lack of regulation dealing with the disposal of such arisings. The manufacture, transport, sale and storage of explosives is regulated by various national and local government bodies, but there is a fragmented approach in the destruction of TEPs.

The study indicates that one central facility would be impractical for the storage of TEPs as storage facilities need to be close to the arisings. Also, the disposal of TEPs needs specialist knowledge (which the military has) and this expertise would not normally reside in waste management companies. The previous National Hazardous Waste Management Plan recommended that an appropriate agent of the state be appointed for the management of TEPs. The NaDWaF study recommends that further feasibility should be considered in the establishment of a network of small storage units, perhaps at coastguard stations, with a view to collection and destruction being contracted to a suitable private contractor. It is likely that shipment to a destruction facility in the UK may be the most viable option as the volumes arising may be too low to warrant the investment in such a facility in Ireland. Another option indicated in the study would be to consider the UK Maritime and Coastguard Agency storage facility in Belfast as a main central facility where TEPs are delivered and stored prior to destruction at a facility in England. This option could be explored as part of potential north-south cooperation as recommended in this revised Plan.

6.8 Waste industry business development support

Given the competitive European environment in hazardous waste management and treatment, the role of industrial development authorities is key in the development of indigenous companies involved in hazardous waste management. Enterprise Ireland has a clear function in the development of business opportunities for indigenous firms in Ireland and encourages and supports its clients along all stages of the business development process to help them succeed in the global economic environment. Enterprise Ireland clients are primarily manufacturing and internationally traded services companies employing ten or more people. Enterprise Ireland's focus is on five main areas of activity: achieving export sales; investing in research and innovation; competing through productivity; starting up and scaling up; and providing management development, strategy and advice. Enterprise Ireland has developed a range of programmes and supports to suit the varying phases of company and business development from early stage start-up companies to companies achieving annual sales of >€20m.

The main focus of Enterprise Ireland supports in the environmental sector relates to the commercialisation and development of technologies, products and/or processes that have a commercial potential. Enterprise Ireland provides feasibility and R&D support to companies that are operating in this sector. Commercialisation funding and support for industry-led research projects are also available for research projects based in third-level institutions. Details on supports available from Enterprise Ireland can be found at www.enterprise-ireland.com. County and city enterprise boards[102] provide many equivalent supports to small businesses, including information services, grants for feasibility studies, financial supports, "soft supports" such as mentoring and training, and other services such as "techcheck" which provides mentored assessments towards the effective use of technology (www.techcheck.ie). Intertrade Ireland's[103] role includes the development and delivery of programmes to help companies take advantage of the business opportunities available across the island of Ireland. It also supports networks that enable businesses to share their experience and expertise, develop new products and identify new markets.

6.9 Potential for all-island co-operation

There are potential economies of scale to be achieved through full opening of the Northern Ireland and Republic of Ireland waste markets. Certain companies already operate on an all-island basis and certain hazardous waste streams currently move across the border, including waste oils, fluorescent lamps and waste electrical and electronic equipment. All such movements are subject to the EU Regulation on the transfrontier shipment of waste and companies must set aside administrative and financial resources to satisfy the competent authorities in both jurisdictions. The *UK Plan for Shipments of Waste*[104], which came into force on 9 August 2007 (last updated in May 2012), allows "shipments of hazardous waste [for *disposal*] between Northern Ireland and the Republic of Ireland, in either direction, provided that such waste is both generated and disposed of within Northern Ireland or Ireland". Shipments made under this policy "are restricted to those destined for the following disposal operations:

- D5 specially engineered landfill (e.g. placement into lined discrete cells which are capped and isolated from one another and the environment, etc.);
- D10 incineration on land; and

102 www.enterpriseboards.ie
103 www.intertradeireland.com
104 DEFRA, 2012. *UK Plan for Shipments of Waste.* (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69546/pb13770-waste-shipments.pdf)

- D9 physico-chemical treatment which results in final compounds or mixtures which are discarded by means of any of the operations above."

The provision of common all-island landfill capacity for hazardous waste, including asbestos waste for example, is possible within UK policy and is not prohibited in Irish policy. Similarly, it is still possible for all-island incineration and physico-chemical treatment capacity to be planned for and taken into consideration by treatment operators. The DECLG should seek to further examine the potential for joint north-south approaches and co-operation in the provision of all-island hazardous waste disposal and treatment[105] facilities as proposals arise, also taking into account recommendations outlined in the abovementioned National Difficult Waste Facility study.

105 The Department of the Environment in Northern Ireland in its "Statement of Facility Needs" has indicated that over 20,000 tonnes of hazardous waste, including asbestos, requires landfill each year. Northern Ireland regulations state that only pre-treated hazardous waste may be landfilled. The Statement of Facility Needs also indicated that disposal capacity for around 2,500 tonnes of asbestos per annum should be provided in at least two locations in Northern Ireland. A network of asbestos transfer stations is also recommended.

7. Legacy issues

The following continue to be regarded as "legacy issues" in the context of hazardous waste:

- the legacy of historical waste disposal practices in a large number of old landfills, many undocumented, around the country. While most of these old landfills would not be expected to contain significant quantities of hazardous waste, an identification, assessment and action-planning exercise is required to deal with them (Section 7.1); and
- soil and ground contamination is associated with a wide range of historical activities such as coal gasification, land reclamation and filling stations (garages). "Contaminated soil" is that material that requires treatment and management and is often dug up and removed from the site during redevelopment (see Section 7.2).

Other legacy issues also described in this section include extractive waste from historical sites and contaminated harbour sediments.

7.1 Closed landfills

Local authorities are obliged under Section 22(7)(h) of the Waste Management Act 1996 as amended to identify sites at which waste disposal or recovery activities have been carried on, to assess those sites and to take measures to prevent environmental pollution. In a related measure, Section 26(2)(c) of the Act requires equivalent identification and assessment of sites at which waste disposal activities were carried out that to a significant extent involved hazardous waste. The Code of Practice for the Environmental Risk Assessment for Unregulated Waste Disposal Sites was published by the EPA in 2007[106] and includes guidance on identifying waste disposal and recovery sites, and sets out a risk-based assessment procedure that should be applied to sites identified in accordance with Sections 22(7)(h) and 26(2)(c) of the Waste Management Act. A web-based system for local authorities to provide registers for such sites (under Sections 22 and 26 of the Waste Management Act 1996) has been rolled out by the EPA and updated in 2009.

Twenty-five sites have been identified as containing hazardous waste. Of these, sixteen are local authority sites, five are privately owned, two are pre-1977 sites[107] and two are illegal sites. The nature and extent to which these and other landfill sites may have been used to dispose of hazardous waste to a significant extent in the past will only become apparent following appropriate site investigations.

The Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations 2008 (S.I. No. 524 of 2008) required the identification and registration of local authority operated unlicensed sites by end-June 2009. Currently a total of 284 sites that fall under these regulations are entered in the electronic register. Registration is to be followed by site risk assessments and regularisation via an EPA authorisation system.

Once an application is made, the EPA assesses the adequacy of the risk assessment carried out. A Certificate of Authorisation is then issued in due course, identifying whether any additional measures, additional to those identified by the risk assessment, need to be addressed. This would be with a view to protecting human health and the environment in line with the waste and groundwater directives.

106 http://www.epa.ie/pubs/advice/waste/waste/epa_cop_waste_disposal_sites.pdf
107 Pre Waste Framework Directive sites

To date, a number of historic unlicensed landfill sites have been subjected to Tier 1 Risk Assessment and their risk level identified.

At the time of writing, 15 applications for Certificates of Authorisation are being considered by the EPA and one has been granted. The EPA has estimated that considerable financial resources will be required, over a long period of time, to apply full risk assessment and complete any necessary remedial actions to these sites.

The DECLG is funding an ongoing pilot project on environmental risk assessment of legacy landfills. Since this project commenced in 2009, approximately 40 site investigations have been completed. The EPA has provided assistance by developing guidance to ensure site investigations are targeted and avoid potential unnecessary and costly investigations. Overall, it is estimated that the application of this guidance can result in savings in the range of 30%–45%. With nearly 300 sites, the potential saving to the public purse could be up to €7m.

Any project proposals for landfill site remediation or associated works would require screening for Appropriate Assessment and if necessary be subject to Appropriate Assessment prior to commencement of any works, as such sites may impact on European Sites within the meaning of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011).

7.2 Contaminated soil

Under Article 2.1 of the revised Waste Framework Directive, land including unexcavated soil is outside the scope of the Directive and therefore contaminated land is subject to waste legislation only when it is subject to disturbance by excavation.

Currently there is no specific legislation addressing contaminated land in Ireland and to date numerous approaches to the problem, including the *ad hoc* application of standards and methodologies from other countries, have been applied. Owners/occupiers of contaminated land still retain liability under, *inter alia*, water pollution and health and safety legislation. A recent relevant legislative measure has been the introduction of the European Communities (Environmental Liability) Regulations 2008[108] which came into force in Ireland on 1 April 2009. These regulations clearly assign rules on liability and when remediation must be carried out, although these regulations do not apply retrospectively in that they do not cover contaminated land that pre-dates this legislation. In 2011, the EPA published guidance[109] on these regulations.

In February 2012 the European Commission published a policy report on the implementation of the soil strategy and ongoing activities. The report provides an overview of the actions undertaken by the European Commission to implement the strategy and presents current soil degradation trends both in Europe and globally, as well as future challenges to ensure protection.

While contaminated soil is generated mainly in the redevelopment of former industrial sites, it is also generated through fuel-oil and chemical spills and accidents and from the remediation of former waste disposal sites. Figure 11 sets out the general routes and options for contaminated soil management. An arbitrary distinction is drawn between recently contaminated soil and historically contaminated sites. "New contamination" is that which typically arises from petrol or oil spills at service stations or domestic houses as a result of poor facility management or equipment failure. *In-situ* remediation is sometimes carried out. The alternative to on-site treatment is to remove contaminated soil for treatment off-site.

108 Statutory Instrument No. 547 of 2008

109 http://www.epa.ie/pubs/advice/general/Liability_Regulations%20Final%20August%202011.pdf

One facility[110] in Ireland is licensed to treat up to 40,000 tonnes of contaminated soil per annum. All other off-site treatment currently takes place abroad. Soil is typically treated by some form of physical treatment and it is then landfilled or re-used in a low grade application, depending on the quality of the final treated soil.

Figure 10 illustrates the reported quantity and treatment location of contaminated soil removed from development sites between 2004 and 2011. By far the trend shows a greater proportion of contaminated soil that is removed from redevelopment sites is exported, however in recent years the quantity of contaminated soil has dramatically decreased as a result of the economic downturn and the consequential low level of development activity.

So-called "historical contamination" is typically associated with contamination by heavy metals, polyaromatic hydrocarbons and other difficult chemicals. There are a limited number of such sites in Ireland, mainly related to former industrial activities such as coal gasification, historic mine sites[111], tanneries and waste disposal sites. The management of contaminated soil at such sites is controlled under planning and development legislation. A waste permit or licence is generally required where on-site recovery or disposal activities are proposed.

IPPC activities that have given rise to contaminated land are captured under the EPA licensing regime[112].

Past stimuli in Ireland for remediation and site improvements were driven by economic factors and the high return on investment for urban sites. This has changed dramatically, and there is potential for a situation where in the short to medium term Ireland is left with a growing number of "orphan sites" that pose a risk to the environment yet the original owners no longer have the incentive or the means for remediation.

110 Enva Portlaoise, waste licence register number W0184-01.

111 *Historic Mine Sites – Inventory and Risk Classification*, Volume 1A, joint study carried out by the Environmental Protection Agency and the Geological Survey of Ireland, 2009.

112 http://www.epa.ie/terminalfour/waste/index.jsp

The actual scale of future arisings is unknown, however, it is clear that the lack of treatment capacity in Ireland to entirely manage this waste stream indicates a continued need to export significant quantities of soil. If contaminated soil were to be treated in Ireland, treated soil would be potentially available as an engineering resource for the same redevelopment works where it was generated.

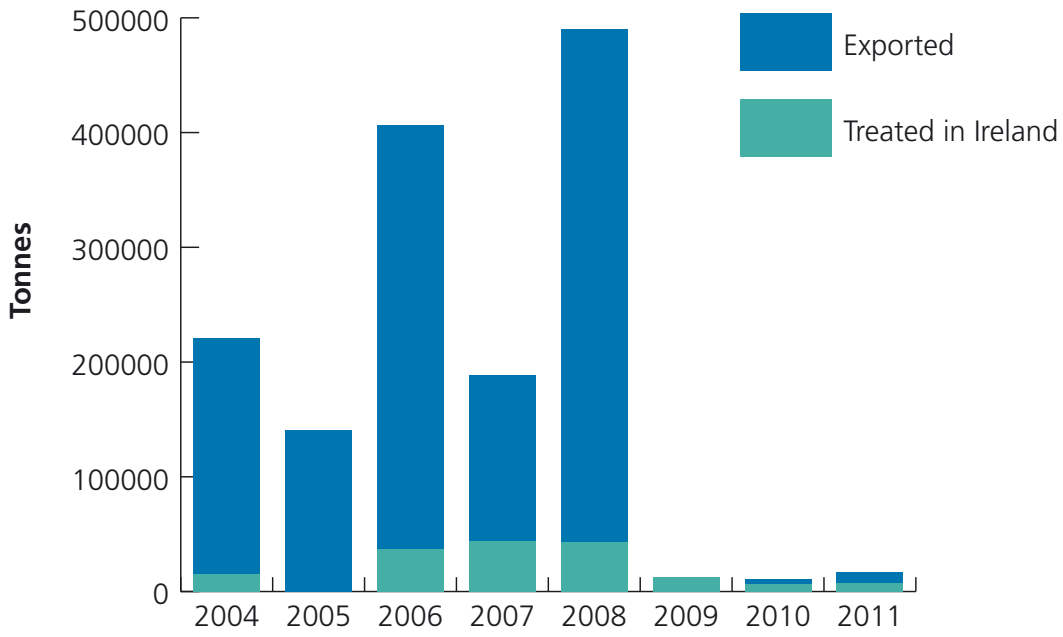

Figure 10 Location of treatment of reported contaminated soil

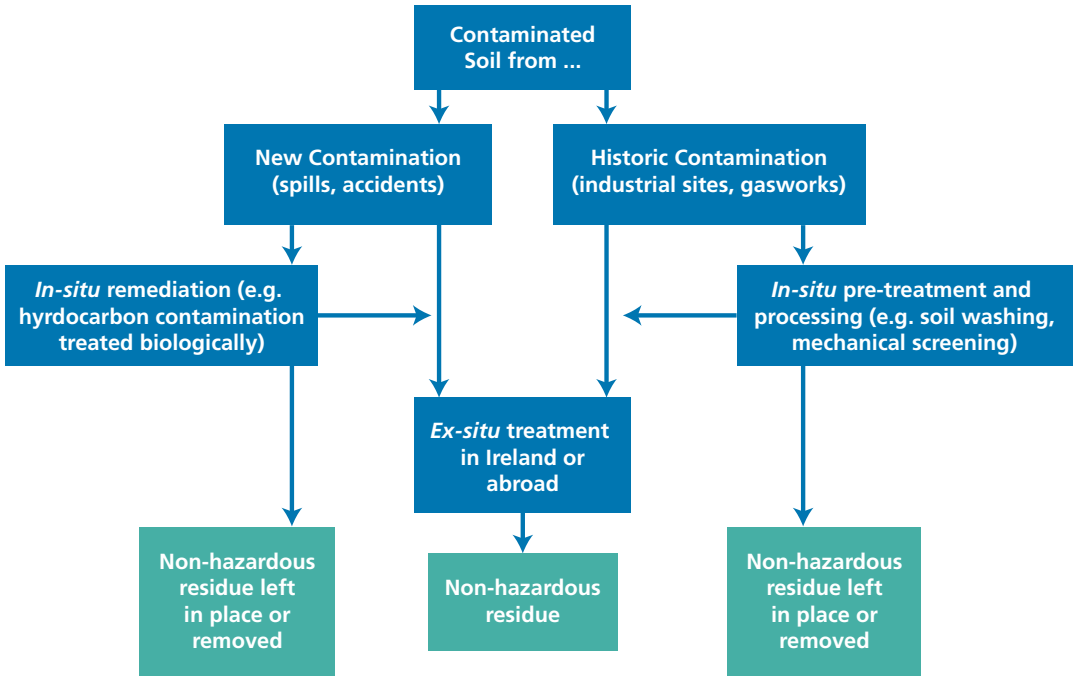

Figure 11 Overview of contaminated soil management routes and option

In 2013 the EPA published Guidance on the *Management of Contaminated Land and Groundwater at EPA Licensed Sites*[113]. This document sets out the EPA's position in relation to the management of contaminated land and groundwater at EPA licensed sites. The approach outlined may also be suitable for the purposes of assessing Land Damage at sites under the Environmental Liability Regulations. The principal aim in dealing with contaminated land and groundwater related issues is to secure the protection of human health, water bodies (including groundwater) and the wider environment. The risk based approach in this guidance is considered best practice for the assessment and remediation of contaminated land and groundwater at EPA licensed sites.

7.2.1 Options for management of contaminated soil in Ireland

Given the apparent lack of sophistication in treatment methods used for contaminated soil, there would appear to be no obvious technical barriers to providing more facilities for the commercial treatment of contaminated soil in Ireland. The barriers are more likely to be logistical and economic, including:

- contaminated soil is often generated in large quantities from the redevelopment of city docklands (Dublin in particular to date). It can be cost-effective to load the soil from such locations directly onto ships for bulk export, avoiding extensive and relatively expensive road transport;
- low gate fees for large consignments in established facilities abroad make it difficult for new domestic facilities to compete;
- uncertainty in future arisings makes business planning difficult. There is a perception that there is a limited number of contaminated sites in Ireland and this discourages investment in contaminated soil treatment facilities.

The continued absence of a legislative requirement for a published register of contaminated sites makes it difficult to plan ahead for contaminated soil treatment. Development of a public register of contaminated sites, and a concerted programme to investigate and remediate these, may change the outlook for developing treatment facilities in Ireland.

Local authorities could, where they have not already done so, take a pro-active approach in planning for docklands redevelopment and other brownfield remediation by, for example, requiring the coordination of contaminated soil management by developers. This could enable a single, if temporary, point of treatment to be established with the appropriate environmental authorisations and controls to serve the overall area in question. This would mean that treated soil is then available for engineering or other uses, assuming adequate quality standards are achieved. Area and development plans that include the redevelopment of docklands or other brownfield sites should take the management of contaminated soil into consideration from this perspective. Plans should set an objective to avoid export where treatment in Ireland is technically and economically feasible and where such treatment would not result in greater emissions or other impacts being generated from transport. This objective is already disseminated to planning and development authorities by the EPA in carrying out its role as environmental authority under the Strategic Environmental Assessment Regulations.

113 http://www.epa.ie/pubs/advice/waste/contaminatedland/contaminatedland

Regional Planning Guidelines would appear to be a useful route to co-ordinate management of environmental issues arising from brownfield and harbour management. The inclusion of a comprehensive section dealing with contaminated land should be considered in future regional planning policy and guidelines. Area and development plans must have regard to regional planning guidelines.

Where possible and environmentally acceptable, *in-situ* remediation should be considered in all relevant projects. This has the potential to reduce the excavation, transport and replacement of soil.

Mobile plant provides a flexible mechanism for providing *in-situ* treatment and recycling of soil and avoiding export. Mobile plant requires a waste licence under the Waste Management (Licensing) Regulations, 2004, or a waste facility permit under the Waste Management (Facility Permit and Registration) Regulations, 2007. The regulations require detailed assessments of treatment sites, and this reportedly deters investment in equipment or the entry of Northern Ireland or overseas operators to the Irish market. The result is that no mobile plant operates in Ireland. The use of mobile plant in other jurisdictions could be examined with a view to considering new ways of regulating the activity in a manner that does not cause environmental pollution.

7.3 Harbour sediments

Following the Foreshore and Dumping at Sea (Amendment) Act 2009, the EPA was designated the competent authority for permitting Dumping at Sea from 15 February 2010. This function involves assessing applications for the offshore dumping of dredged material from ports and harbours. Dumping is only allowable where suitable alternative methods of re-use, treatment or disposal of the dredged material are not available. Before a Dumping at Sea Permit can be granted by the EPA, dredged material must be well characterised and sediment samples analysed for a range of parameters as described in the First Schedule to the Dumping at Sea Acts. In accordance with guidelines issued by the OSPAR and London Conventions, Ireland has established upper and lower action levels for a range of contaminants (metals, PCBs, PAHs, organochlorine pesticides, organotins). These data are used in a weight-of-evidence assessment to determine the suitability of dredged material for disposal at sea. Dredged material with contaminant concentrations exceeding the relevant upper action levels is classed as heavily contaminated and generally regarded as unsuitable for unconfined dumping at sea.

7.4 Extractive waste from historical sites

The EU Extractive Waste Directive (2006/21/EC) requires Member States to prepare a National Inventory of closed mine sites (operated in the last two centuries or so in Ireland's case). The inventory is intended for those historical sites which have the potential to cause, or are causing, risk to the environment or human health. Some of the wastes in these historical facilities may have hazardous properties, though would not be "Hazardous Waste" within the meaning of the EU Waste Framework Directive or this revised Plan, because neither speaks to extractive activities closed before the coming into effect of the 1991 amendment of Waste Directive (Council Directive 91/156/EEC).

The EPA and the Geological Survey of Ireland collaborated in the preparation of a national inventory of closed mine sites. This study, *Historic Mine Sites – Inventory and Risk Classification*, was published in 2009[114]. Many of the data can be viewed and queried on EPA GIS Envision Historical Mines portal *http://gis.epa.ie/Envision*, and related data are also available to download.

114 *http://www.epa.ie/pubs/reports/land/mines*

8. Implementation

Implementation of this revised National Hazardous Waste Management Plan will require appropriate financial and personnel resources to ensure that all recommendations in the Plan are acted upon by the nominated bodies and within acceptable timescales. The principal implementation and monitoring bodies for the revised Plan are as follows:

- The **Department of the Environment, Community and Local Government** should adopt a policy leadership and sponsoring role for the Plan's implementation by:
  - making resources available for the Plan's implementation;
  - fulfilling specific implementation roles as identified in the Plan;
  - making new regulations where necessary and appropriate; and
  - ensuring other Government departments and public bodies fulfil their roles and responsibilities identified in the Plan.
- The **Environmental Protection Agency** will promote and co-ordinate the Plan's implementation, and will continue to take responsibility for:
  - chairing the National Waste Prevention Committee with oversight of the Plan's implementation;
  - fulfilling specific implementation roles as identified in the Plan; and
  - monitoring and reporting on the Plan's implementation.
- The **National Waste Prevention Committee** should continue to act as the principal stakeholder oversight body for the Plan's implementation, with responsibility for:
  - enabling two-way communication with sectoral and stakeholder interests;
  - participating on sub-groups that may be established for specific purposes, as may be decided by the Committee; and
  - providing review, feedback and comment on implementation reports prepared by the Environmental Protection Agency.
- **Local authorities'** participation is essential for promoting good hazardous waste management practices and they are the subject of a considerable number of specific recommendations. They should:
  - ensure that regional waste management plans, as well as regional and area development plans, take this Plan into account;
  - fulfil their important role in providing small-scale collection services and generally raising awareness in hazardous waste management; and
  - engage with the Local Authority Prevention Network.

8.1 Summary of recommended actions and responsibilities

This summary of recommendations below, which arise from the analysis and considerations included in the revised Plan, is not necessarily presented in the order in which they could or should be implemented.

Administrative arrangements

1. Local authorities should consider the information provided in this revised Plan and, in accordance with Sections 22(8) and 26(6) of the Waste Management Act 1996 as amended, take relevant recommendations of this revised Plan into account in their revision and implementation of regional waste management plans, as well as regional planning guidelines and regional and area development plans.

   Responsible: Local authorities

2. Public bodies should be aware of this revised Plan and take its provisions and recommendations into account in the execution of their environmental protection, industrial development and other functions, with the objective of improving their own hazardous waste management and that of their clients, customers or stakeholders.

   Responsible: All public bodies

Prevention

3. Continuously engage with priority sectors (pharmachemical, health, agricultural, household, publishing & printing and transport) and communities (e.g. via the Local Authority Prevention Network) on hazardous waste prevention activities as detailed in the revised Plan.

   Responsible: Environmental Protection Agency, local authorities and relevant sectoral organisations

4. Incorporate the prevention of the generation of hazardous waste into the National Waste Prevention Programme and the implementation measures within the Regional Waste Management Plans.

   Responsible: Environmental Protection Agency, local authorities

5. Engage with businesses towards achieving hazardous waste prevention, cleaner technology and better compliance with regulation.

   Responsible: Environmental Protection Agency, local authorities

6. In implementing the Green Public Procurement Action Plan provide for the substitution or reduction in use of hazardous materials and products in public procurement (eco-design).

   Responsible: All public bodies

7. Carry out waste characterisation studies, via the National Waste Prevention Programme, to profile hazardous waste content of arisings from smaller sources (e.g. households and small business).

   Responsible: Environmental Protection Agency

8. With support from producer responsibility initiatives, carry out studies on relevant waste streams, (e.g. packaging, WEEE), to determine if product-based legislation is having its desired effect and the hazardousness of related waste streams is reducing.

Responsible: Environmental Protection Agency in collaboration with other organisations (e.g. Producer Responsibility Initiative stakeholders)

9. Assist relevant Departments and Agencies to examine the feasibility of alternatives to the diesel fuel marking system that can help eliminate illegal diesel laundering operations and prevent the generation of hazardous waste and associated environmental clean-up costs arising from such activities.

Responsible: Department of the Environment, Community and Local Government in consultation with relevant stakeholders (e.g. Office of the Revenue Commissioners)

Collection of hazardous waste

10. (i) Plan and make provision for resourcing local authorities to develop adequate collection facilities for small-scale quantities of hazardous waste from households and small businesses (e.g. at civic amenity sites, mobile special collections). This could include resourcing through sectoral agreements and the development of potential new producer responsibility obligations for certain hazardous waste streams.

(ii) Consider the establishment of a network of collection and transfer facilities to capture small-scale quantities of legacy wastes (e.g. asbestos arisings from DIY and small contracting jobs) for environmentally sound management, having regard to the "polluter pays" and "waste producer" principles. Engage with stakeholders on the development of appropriate operational conditions for such facilities.

Responsible: Department of the Environment, Community and Local Government, local authorities

11. Continue to carry out awareness raising and enforcement to ensure improved hazardous waste collection from small–scale hazardous waste streams (e.g. waste oils from garages).

Responsible: Relevant sectoral organisations, local authorities

12. Assessment and development of potential new producer responsibility obligations for certain hazardous waste streams (e.g. a take-back scheme for unused or expired human medicines), on foot of the recently established review of producer responsibility initiatives and detailed studies into priority hazardous waste streams.

Responsible: Department of the Environment, Community and Local Government

13. Complete a farm hazardous waste collection pilot project and publish pilot project research findings and recommendations.

Responsible: Environmental Protection Agency in collaboration with relevant bodies

Infrastructure and self-sufficiency

14. (i) Keep under review the provision and facilitation of hazardous waste treatment[115] capacity and make recommendations on the appropriate economic or other instruments necessary for such capacity to be provided, either by the private or public sector.

    (ii) Develop national policy or guidance to direct the control of hazardous waste shipments in order to facilitate self-sufficiency in hazardous waste treatment where this is technically, economically, strategically and environmentally advisable.

Responsible: Department of the Environment, Community and Local Government in consultation with relevant stakeholders

15. Prepare and maintain, in consultation with various stakeholders, an inventory of national hazardous waste recovery and disposal capacity.

Responsible: Environmental Protection Agency

Regulatory

16. Consolidate and reform existing regulations where appropriate, and make provision for new hazardous waste regulations where the need becomes apparent during implementation of this revised Plan.

Responsible: Department of the Environment, Community and Local Government

17. Carry out a review of waste licensing and permitting legislation in order to establish a proportionate regulatory mechanism, including relief, to facilitate collection, transport, take-back and temporary storage of certain hazardous wastes arising from small sources.

Responsible: Department of the Environment, Community and Local Government in consultation with relevant stakeholders

18. Cooperate in enforcement activities concerning product based pollution prevention (e.g. Restriction of Hazardous Substances in Electrical and Electronic Equipment, Persistent Organic Pollutants (POPs)).

Responsible: Relevant public authorities

115 'Treatment' means recovery or disposal operations, including preparation prior to recovery or disposal (EU Waste Framework Directive 2008/98/EC)

Legacy issues - Closed landfills

19. Identify, assess and, where necessary, remediate sites where hazardous waste was to a significant extent disposed of in the past. This action should conform to the Code of Practice prepared by the EPA's Office of Environmental Enforcement.

Responsible: Local authorities

North-south initiatives

20. Seek to establish, with the appropriate Northern Ireland authorities, a North-South co-operative group working on hazardous waste issues.

Responsible: Department of the Environment, Community and Local Government

Guidance and awareness

21. Conduct regular awareness and information campaigns (e.g. via social media) to pro-actively update and inform individuals and businesses of available hazardous waste collection services in their areas, as well as their legal obligations. Provide and disseminate practical guidance on the management of sectoral hazardous waste (e.g. household, commercial, farming).

Responsible: Local authorities and relevant public authorities and sectoral organisations (e.g. Department of Agriculture, Food and the Marine)

22. Prepare up-to-date factsheets on each of the main hazardous waste streams including information on appropriate management options for such waste streams.

Responsible: Environmental Protection Agency

23. Complete the code of practice/guidance document on the minimum operational and environmental standards for accepting hazardous waste at civic amenity sites, and disseminate to local authorities and civic amenity site operators.

Responsible: Environmental Protection Agency

24. Continue to promote awareness and guidance on the correct management of healthcare hazardous waste (e.g. Green Healthcare Programme) to all HSE employees, as appropriate.

Responsible: Environmental Protection Agency, Health Service Executive

25. Carry out a study to evaluate and recommend an appropriate regulatory mechanism and relevant guidance for the management and disposal of spent sheep dip.

Responsible: Environmental Protection Agency in consultation with relevant stakeholders

Plan Implementation

26. Devise sectoral and waste stream specific indicators (e.g. industrial, farming, healthcare) to help monitor implementation of the revised Plan's objectives. Prepare and make available key hazardous waste data indicators at regular intervals.

Responsible: Environmental Protection Agency in consultation with relevant bodies

27. Periodically report on the progress on the revised Plan's implementation.

Responsible: Environmental Protection Agency

8.2 Resource requirements for the revised Plan

There are two essential prerequisites to ensure that the revised Plan is implemented – sufficient staff and financial resources. Recognising that Ireland is currently experiencing significant cutbacks in public sector resources, the revised Plan has sought to set out recommendations that can realistically be implemented over the plan period.

Public bodies should assess what resources they need to respond to the recommendations for action made in this revised Plan (as summarised in Section 8.1). Failure on the part of public bodies to allocate resources to the revised Plan's implementation will result in the revised Plan not being fully implemented.

8.3 Consequences of not implementing the revised Plan

Some of the consequences of not putting in place a programme to implement the revised National Hazardous Waste Management Plan are as follows:

- many generators of hazardous waste will remain unaware of their obligations in respect of the management of hazardous waste;
- levels of unreported hazardous waste will remain high and could grow;
- small businesses and households may not have full access to affordable collection services, resulting in small-scale hazardous waste being disposed of with general refuse in landfills not designed or licensed for hazardous waste;
- improvements and consistent high standards in civic amenity site storage of hazardous waste will not materialise, resulting in potential for poor management of deposited materials;
- producers will not be made responsible for the proper management of hazardous waste resulting from products placed by them on the market;
- knowledge will not be developed on available and optimal hazardous waste management routes in Ireland to avoid large-scale export of waste for thermal treatment;
- hazardous waste treatment capacity (e.g. landfill) will remain unavailable, ensuring that large quantities of asbestos waste in particular will continue to be exported or disposed of in an unauthorised manner.

8.4 Objectives, targets and indicators

Table 26 summarises the objectives that will be adopted for the revised National Hazardous Waste Management Plan (see Section 1.3) and includes environmental objectives identified during the Strategic Environmental Assessment (see Section 1.4). Table 27 and Table 28 summarise the targets and indicators that will provide a means of measuring progress towards these objectives. Targets and indicators are intended to allow for monitoring the implementation of the revised Plan (management indicators) and monitoring any environmental effects of the revised Plan's implementation (environmental indicators). There are two principal mechanisms for reporting on the revised Plan's implementation progress. The National Waste Report will provide regular statistics on hazardous waste generation, treatment and export. A mid-term review report on the implementation of the revised Plan will also be prepared – see Section 8.5.

Table 26 Summary of revised Plan and environmental objectives

Summary of revised Plan objectives *(see Section 1.3)*	
1	To prevent and reduce the generation of hazardous waste by industry and society generally.
2	To maximise the collection of hazardous waste with a view to reducing the environmental and health impacts of any unregulated waste.
3	To strive for increased self-sufficiency in the management of hazardous waste and to minimise hazardous waste export.
4	To minimise the environmental, social and economic impacts of hazardous waste generation and management.
Summary of environmental objectives *(from Chapter 7 of the Environmental Report - see Section 1.4 of this document)*	
1	To protect water quality (rivers, lakes, marine and groundwater) from hazardous waste
2	To protect air quality from hazardous waste and/or reduce air pollution or limit to levels that do not damage the natural environment or human health
3	To minimise greenhouse gas emissions associated with hazardous waste management (including transport)
4	To safeguard soil quality and quantity from hazardous waste and reduce soil contamination
5	To maximise use of material assets including the built environment, energy and raw materials
6	To minimise the export of hazardous waste for treatment and/or disposal and reduce emissions due to transportation
7	To conserve and enhance biodiversity, including flora and fauna, and integrate biodiversity considerations into actions relating to or arising out of any of the recommendations in the National Hazardous Waste Management Plan
8	To protect human health from hazardous waste

Table 27 Revised Plan targets and indicators

Target for lifetime of Plan	Indicator	Data availability and source	Frequency in assessing progress
Initiate and implement hazardous waste prevention projects	Scoping, commencement and progress reports for individual projects	EPA – National Waste Prevention Programme	Annual
Reduce the generation of hazardous waste relative to production at targeted, participating or reporting organisations or sectors. Influence positive behavioural change by supporting businesses, communities and householders to become more resource efficient.	Reduction in hazardous waste generation relative to production at relevant, participating or targeted organisations or sectors. Greater engagement by householders, communities and businesses in resource efficient behaviours (e.g. through participation in EPA BeGreen initiatives)	EPA - all prevention projects will have built-in quantitative and qualitative indicators	Annual
Minimise the generation of unreported hazardous waste	Estimation of unreported hazardous waste	EPA - estimation will be made every two years for the National Waste Report	Every 2 years
Increase the deposit of household and small business hazardous waste at o civic amenity sites; o other static collection points; and o mobile services.	Quantity of household and small business hazardous waste deposited at static facilities Availability of collection/ deposit services	EPA - National Waste Report team	Annual
Increase collection of waste oils from smaller sources (e.g. garages)	Quantity of waste oils collected and treated at hazardous waste facilities	EPA – National Waste Report team	Annual
Carry out farm hazardous collection pilot project to inform producer responsibility initiatives	Assessment and development of new producer responsibility obligations Quantity of (hazardous) waste collected on foot of producer responsibility obligations	Department of the Environment, Community and Local Government EPA – National Waste Report team	Annual
Increase on-site treatment of hazardous waste generated at IPPC/IED licensed facilities	Quantity of hazardous waste treated at IPPC/IED licensed facilities	EPA – National Waste Report team	Annual

cont'd

cont'd

Target for lifetime of Plan	Indicator	Data availability and source	Frequency in assessing progress
Increase off-site treatment of hazardous waste in Ireland	Quantity of hazardous waste treated or landfilled at merchant facilities in Republic of Ireland	EPA – National Waste Report team	Annual
Reduce export of hazardous waste	Quantity of hazardous waste exported Quantity of contaminated soil exported	EPA – National Waste Report team	Annual
Identify, assess and remediate as necessary all sites where hazardous waste to a significant extent was disposed of	Number of sites identified, assessed and remedial actions undertaken	EPA OEE – Code of Practice implementation records	Every 2 years

Table 28 Environmental targets and indicators

Target for lifetime of plan	Ref to environmental objective (Table 26)	Indicator	Data availability and source	Frequency in assessing progress
Minimise exceedances of emission limits to water and air from licensed hazardous waste facilities	Water Air	Number of hazardous waste facilities in breach of emission limits to surface water, groundwater and air	EPA OEE – licence enforcement files	Every 2 years
Legacy hazardous waste disposal sites to be managed in accordance with Code of Practice	Water Soil	Number of legacy disposal sites to which Code of Practice is applied	EPA OEE – Code of Practice implementation records	Every 2 years
No increase in dioxin levels in ambient environment	Air Human health	Dioxin in cow's milk	EPA – monitoring of cow's milk	When available
Maximise the generation of energy from renewable sources	Climate	Quantity of hazardous waste managed via energy recovery (R1)	EPA – National Waste Report team	Annual

cont'd

cont'd

Target for lifetime of plan	Ref to environmental objective (Table 26)	Indicator	Data availability and source	Frequency in assessing progress
Minimise distance travelled by hazardous waste	Climate Transport	Tonne-kilometres travelled by road and sea	EPA – to be calculated from best available records (e.g. facility records, waste tracking records, TFS) (data not currently collected)	Every 2 years
Minimise export of hazardous waste and move towards self-sufficiency	Transport Material assets	Quantity of hazardous waste exported	EPA – National Waste Report team	Annual
Minimise the generation of unreported hazardous waste	Human health Soil	Estimation of unreported hazardous waste	EPA - estimation will be made every two years for the National Waste Report	Every 2 years
Increase the treatment of contaminated soil in Ireland	Soil Material assets	Quantity of contaminated soil treated in Ireland as a proportion of the total	EPA – National Waste Report and licence enforcement files	Every 2 years
Maximise the use of previously developed land or brownfield sites for appropriate developments including hazardous waste facilities	Material assets	Area of new hazardous waste facilities on greenfield and brownfield sites	EPA – licensing files (data not currently collected)	Every 2 years
Avoid loss or damage to designated sites from siting of hazardous waste facilities	Bio-diversity	Area of designated sites used by or proposed for development of hazardous waste facilities	EPA – licensing files	Every 2 years

cont'd

cont'd

Target for lifetime of plan	Ref to environmental objective (Table 26)	Indicator	Data availability and source	Frequency in assessing progress
Minimise major incidents of unauthorised disposal of hazardous waste	Human health	Reports of large scale illegal disposal involving hazardous waste (not including relatively small-scale fly-tipping)	EPA – unauthorised waste activities reports and information provided from relevant bodies (e.g. major emergency management bodies)	Every 2 years
Minimise complaints relating to hazardous waste facilities	Human health	Number of complaints received relating to hazardous waste facilities	EPA – licence enforcement files	Every 2 years

The above environmental targets and indicators are also important in helping to achieve environmental goals set out in the EPA's strategic plan for the period 2013-2015 including, for example,

- Limiting and Adapting to Climate Change;
- Protected Water Resources;
- Protected Soil and Biodiversity;
- Sustainable Use of Resources.

8.5 Reporting schedule

With respect to the previous plan, an implementation report was published by the EPA in 2011 which reviewed the Plan's and SEA objectives and identified progress made in implementing recommendations since its publication in 2008 up to mid-2011. This revised Plan provides further up-to-date information regarding the management of hazardous waste in Ireland.

In relation to the revised Plan, the EPA will carry out a mid-term review and will report to the National Waste Prevention Committee on the implementation of this plan, incorporating information from the implementing bodies defined in this plan. The National Waste Report will present statistics on hazardous waste treatment and progress relative to other targets.

APPENDIX A - List of submissions

Public consultation on the Proposed Revised Plan was carried out between 23rd October 2013 and 23 December 2013. A total of 21 submissions were received. Submissions were received from the following:

Angela Hetherton
Animal and Plant Health Association
Cappagh Farmers Support Group
Cork Harbour Alliance for a Safe Environment
Department of the Environment, Community and Local Government
Dublin City Council/National Transfrontier Shipment Office
Dun Laoghaire - Rathdown County Council
Engineers Ireland
Health Service Executive
Indaver Ireland Ltd
Irish Doctors Environmental Association
Irish Medicines Board
Irish Waste Management Association
Monaghan County Council
Noel Duffy, Cork Institute of Technology
Patel Tonra Environmental Solutions (on behalf of Murphy Environmental Hollywood Ltd)
Roscommon County Council
SRCL Ltd
Teresa Ryan-Feehan, Site Manager, Athlone Recycling Centre
Veolia Environmental Services Technical Solutions Ltd

A compendium of submissions and responses is available at *www.hazardouswaste.ie.*

APPENDIX B - Hazardous waste generation and treatment data

The following tables are contained in this appendix:

- Table 29 Indicators for hazardous waste generation and management
- Table 30 Treatment of hazardous waste on-site of generation at IPPC licensed facilities in 2011

Table 29 Indicators for hazardous waste generation and management

All data sourced from National Waste Reports (2006-2011)

Indicator	2006 (t)	2007 (t)	2008 (t)	2009 (t)	2010 (t)	2011 (t)
Industrial hazardous waste treated on-site of generation (predominantly at IPPC-licensed facilities)	88,409	82,732	72,038	74,668	76,655	67,772
… recovered (t)	38,372	46,545	36,446	36,124	39,495	33,301
… disposed (t)	50,037	36,187	35,592	38,544	37,160	34,471
Hazardous waste treated off-site in Ireland at authorised facilities (not including contaminated soil)	60,872	91,240	113,839	89,992	93,549	98,838
… recovered (t)	26,976	52,452	79,245	68,145	59,152	72,877
… disposed (t)	33,896	38,791	34,594	21,848	34,437	25,959
Hazardous waste exported (not including contaminated soil)	134,904	147,542	157,207	150,395	143,180	149,037
… for recovery	69,515	82,770	89,749	98,049	97,735	101,972
… for disposal	65,130	64,675	67,424	52,345	45,445	47,065
… for unspecified treatment	259					
Unreported hazardous waste (estimate)	26,024					
Contaminated soil	406,904	188,127	493,107	12,904	8,850	17,297
… recovered in Ireland	36,872	44,241	43,531	12,428	6,260	7,094
… disposed in Ireland			2			
Exported contaminated soil	370,032	143,906	449,574	476	2,590	10203
… recovered abroad	28,875	17,047	151,891	469		
… disposed abroad	341,158	126,859	297,683	7	2,590	10,203
Industrial hazardous waste generated						
… reported (i.e. sample)	216,411		98,044			
… projected (i.e. total)	271,755		250,311		Refer to Section 3.2	

Table 30 Treatment of hazardous waste on-site of generation at IPPC licensed facilities in 2011

Facility name	IPPC Reg. No.	Waste Type	Recovery/ Disposal Code	Quantity treated in 2011 (tonnes)
Arran Chemical Co. Ltd	P0110-02	Solvents	R2	763
Astellas Ireland Co. Ltd	P0007-03	Solvents	D10	616
		Aqueous washing liquids and mother liquors (07__01*)	D10	1,400
Aughinish Alumina Ltd	P0035-04	Salts and salt cake	D1	20,079
BASF Ireland Limited/ International Detergent Chemicals Ltd	P0052-02	Other industrial hazardous waste	R1	4,720
Phillips 66 Bantry Bay Terminals	P0419-01	Oil waste (mineral oil)	R9	180
Eli Lilly	P0009-03	Solvents	D10	2,944
		Solvents (Halogenated where specified)	D10	68
Galmoy Mines Ltd	P0517-01	Oily sludges	R10	45
Irish Industrial Explosives Ltd	P0055-01	Other industrial hazardous waste	D10	2
Mallinckrodt Medical Imaging Ireland	P0050-02	Solvents	R2	6347
		Solvents	D8	306
		Solvents (Halogenated where specified)	D8	<0.1
		Solvents (Halogenated where specified)	D9	122
Merck Sharp & Dohme	P0011-04	Solvents	D8	1,061
			R2	1,820
Merck Millipore Ltd	P0571-02	Solvents	R2	1,380

cont'd

cont'd

Facility name	IPPC Reg. No.	Waste Type	Recovery/ Disposal Code	Quantity treated in 2011 (tonnes)
Novartis Ringaskiddy Ltd	P0006-03	Other industrial hazardous waste	D10	<0.1
		Packaging (contaminates or containing residues)	D10	25
		Sludges and filter cakes	D10	0.2
		Solvents	D10	<0.1
			D8	284
			R1	1,756
			R2	4,102
		Absorbents, Wiping cloths	D10	30
		Aqueous washing liquids and mother liquors (07__01*)	D10	452
		Solid wastes from MFSU of pharmaceuticals (07 05 13*)	D10	2
		Laboratory and general chemical waste	D10	13
Pfizer Ireland Pharmaceuticals	P0013-04	Solvents	R2	1,130
Pfizer Cork Ltd	P0136-04	Solvents	R2	2,724
		Solvents	R1	13
Roche Ireland Ltd	P0012-04	Solvents	R1	2,415
		Solvents (Halogenated where specified)	R1	958
Schering-Plough (Ireland)	P0015-05	Solvents	R1	1151
Smithkline Beecham (Cork) Ltd	P0004-03	Solvents	D10	2,417
			R2	161
		Solvents (Halogenated where specified)	D10	8

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Facility name	IPPC Reg. No.	Waste Type	Recovery/ Disposal Code	Quantity treated in 2011 (tonnes)
Swords Laboratories	P0014-04	Solvents	D8	1.3
			R2	580
		Solvents (Halogenated where specified)	R2	224
Bristol Myers Squibb Cruiserath	P0552-02	Solvents	R2	1,213
		Solvents (Halogenated where specified)	D10	4,639
			D8	2.5
			R2	154
Temmler Ireland Ltd	P0813-02	Solvents	R2	1,172
		Solid wastes from MFSU of pharmaceuticals (07 05 13*)	R3	294
			Total	**67,772**

Key to D/R codes[116]:			
D codes		**R codes**	
D1	Landfill	R1	Use as a fuel
D4	Surface impoundment	R2	Solvent recycling (reclamation/regeneration)
D5	Engineered landfill	R3	Organic substance recycling (other than solvent)
D8	Biological treatment	R4	Metal recycling
D9	Physico-chemical treatment	R5	Inorganic substance recycling/reclamation
D10	Incineration	R6	Regeneration of acids and bases
D12	Permanent storage	R8	Recovery of components from catalysts
D14	Repackaging prior to D1-D13	R9	Waste oil recycling
		R12	Waste exchange prior to recovery
		R13	Storage prior to recovery

116 Refer to Annexes I and II of EU Waste Framework Directive 2008/98/EC for disposal and recovery operations

Table 31 Licensed and permitted facilities for hazardous waste treatment and transfer[117]

Company name	Licence or Permit Reg. Number	Treatment or transfer facility	Hazardous waste operations	Principal hazardous wastes authorised for treatment	Status
Rilta Environmental Ltd	W0192-03	Transfer and treatment	General chemical and other hazardous waste treatment and storage prior to export	Oily sludges, waste oils, oil filters, photographic waste, contaminated soil, contaminated drums, containers and IBCs, WEEE	Operational
Soltec Ireland Ltd	W0115-01	Transfer and treatment	Solvent distillation and recycling	Solvents distillation	Operational
SRCL Ltd (formerly Eco-Safe Systems Ltd.)	W0054-02	Transfer and treatment	Healthcare risk waste treatment	Healthcare risk waste	Operational
Veolia	W0050-02	Transfer and treatment	General chemical and other hazardous waste storage prior to export	Solvents blending and recycling	Operational
Enva - Portlaoise	W0184-1	Transfer and treatment	Oils and oil filters processing, contaminated soils processing	Waste oils and sludges, contaminated soils	Operational
Enva - Shannon	W0041-01	Treatment and transfer	General chemical waste treatment and storage prior to export	Acid and alkali waste, photographic waste, industrial sludges, laboratory waste, solvents blending, other industrial and commercial chemical waste	Operational
Indaver - Dublin Port	W0036-02	Transfer and treatment	Waste transfer station and solvent blending plant	Solvents blending	Operational

cont'd

117 Please refer to http://www.epa.ie/terminalfour/waste/index.jsp for information on hazardous waste facility licences. Please also check with Local Authorities for facilities that are permitted to accept certain hazardous wastes.

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Company name	Licence or Permit Reg. Number	Treatment or transfer facility	Hazardous waste operations	Principal hazardous wastes authorised for treatment	Status
Safety Kleen Ireland Ltd	W0099-01	Transfer	Solvents and chemical waste storage prior to export	See operations	Operational
Enva - Dublin	W0196-01	Pre-treatment and transfer	Waste oil and oily sludges transfer	Physical chemical treatment of aqueous wastes and storage of packaged wastes on site for onward recovery/disposal	Operational
Enva - Cork	W0145-02	Pre-treatment and transfer	Storage of waste oils for onward recovery to Enva Portlaoise	See operations	Operational
Rilta Environmental Ltd	W0185-01	Treatment and transfer	Processing waste transformers and storage of waste fridges	See operations	Operational
SRCL Ltd	W0055-02	Treatment and transfer	Treatment of healthcare risk and related waste	Healthcare risk waste	Operational
Irish Lamp Recycling	WFP-KE-08-0348-01	Treatment and transfer	Processing fluorescent lamps, treatment of WEEE	See operations	Operational
KMK Metals Recycling Ltd	W0113-04	Treatment and transfer	Metal-rich wastes and sludges storage prior to export	WEEE	Operational
Electronics Recycling	WFP-DC-09-0015-01	Treatment	WEEE treatment	WEEE	Operational
Hi-Volt Ireland Ltd	W0267-01	Transfer	Accepts waste batteries, waste oil, waste oil filters, waste tyres, contaminated soil	Storage	Operational
Rehab Recycle	WPR033/2	Treatment	WEEE treatment	WEEE	Operational

cont'd

cont'd

Company name	Licence or Permit Reg. Number	Treatment or transfer facility	Hazardous waste operations	Principal hazardous wastes authorised for treatment	Status
Electrical Waste Management Ltd	WFP-DS-09-0012-01	Transfer	Accepts small WEEE and refrigeration equipment	WEEE	Operational
The Recycling Village	WFP/MH/11/0005/01	Treatment	Processing of CRTs and monitors	WEEE	Operational
Indaver Ireland Limited - Ringaskiddy	W0186-01	Treatment	Integrated waste management facility, including incineration	Chemical waste including solvents	Not operational

Further facilities (e.g. in Dublin City Council's administrative area) that are also permitted to accept certain hazardous wastes include:

- Padraig Thornton Waste Disposal Ltd (WFP-DC-09-0005-01),
- The Hammond Land Metal Company Ltd (WFP-DC-09-0013-01),
- Summerhill Spares Ltd (WFP-DC-10-0018-01),
- Chevron Environmental Ltd (WFP-DC-09-0015-01),
- Tom Murphy Recovery & Towing Services Ltd (WFP-DC-11-0027-01),
- Rogers Recycling Ltd (WFP-DC-11-0030-01),
- Padraig Thornton Waste Disposal Ltd (WFP-DC-12-0033-01),
- Blancomet Recycling IE Ltd (WFP-DC-12-0034-01)

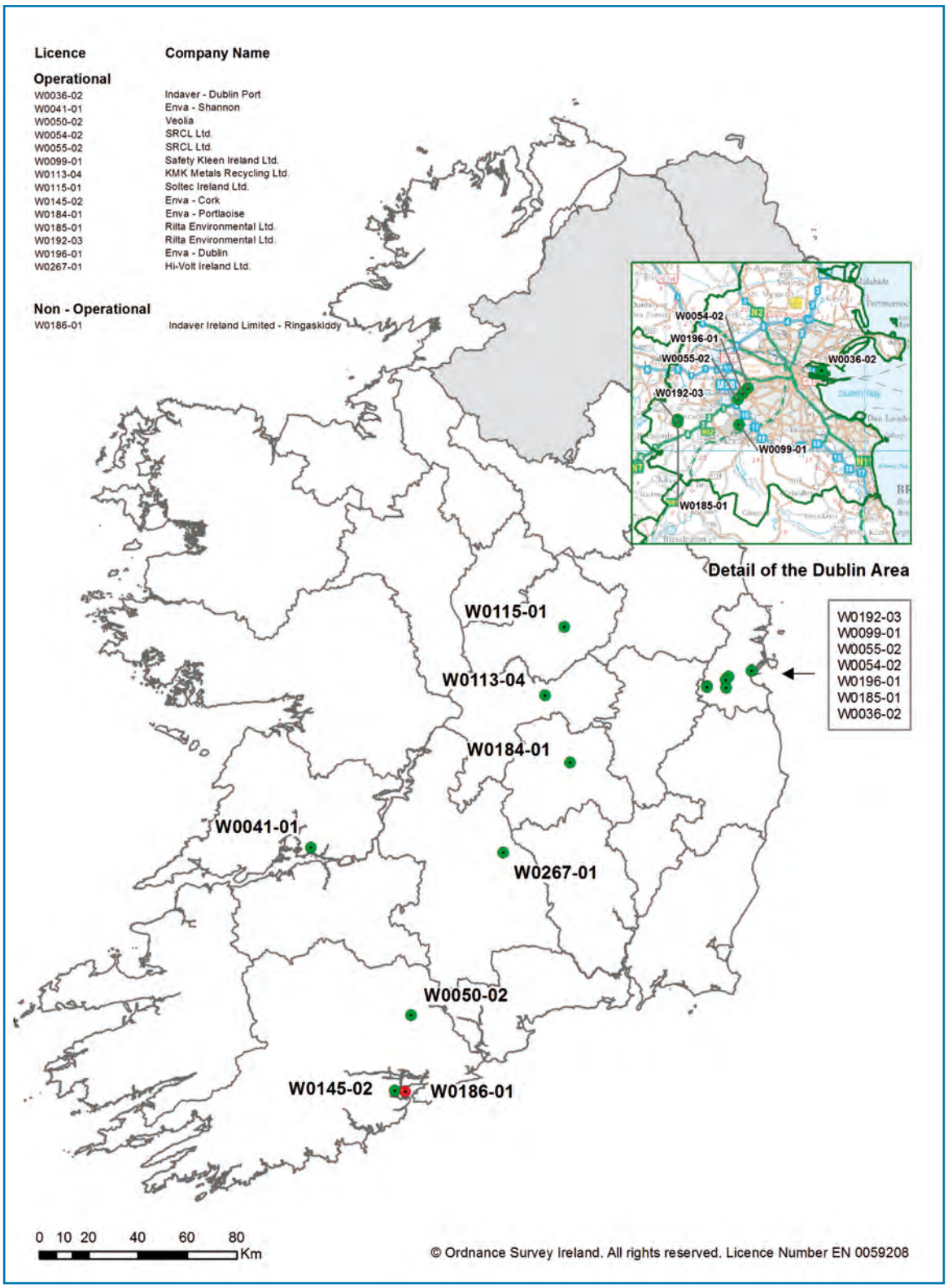

Figure 12 Hazardous waste licensed facilities in Ireland

APPENDIX D - Alternative hazardous waste treatment techniques

Table 32 Alternative hazardous waste treatment techniques

Technology	Description	Status	Relevance in Ireland
Advanced oxidation	This system involves advanced oxidation treatment which can include, for example, the treatment of aqueous organic wastes. This system uses UV and oxidation to destruct complex organic species in aqueous waste and to render them biodegradable.	Established	Ireland produces aqueous organic waste streams (e.g. from PharmaChem industry) and therefore this is an available option.
Ball Milling	Dry, solid and non-concentrated persistent organic pollutants (POPs) are dehalogenated and converted to a fine powder through mechanical and chemical processes.	Emerging	Ireland currently produces a limited amount of the relevant POPs waste and is therefore unlikely to be a relevant location for the application of this technology at commercial scale.
Base Catalysed De-chlorination (BCD)	BCD is a thermal process involving the removal of chlorine from PCB waste by the addition of a base and a catalyst.	Established	Ireland produces a limited amount of chlorinated solvents and is therefore unlikely to be a relevant location for the application of this technology at commercial scale. Were it to become available in EU countries it could offer a treatment avenue for chlorinated wastes from Ireland to compete with incineration.
Catalytic Treatment	Catalysts can convert hazardous waste into inert or safer material using lower temperatures and allowing for safer incineration. This technology is applicable to difficult waste streams such as POPs and chlorinated solvents.	Emerging	Were the technology to become available at commercial scale in EU countries it could offer a treatment avenue for chlorinated wastes from Ireland to compete with incineration.
Gasification	Gasification is a process that converts carbon based waste streams under low pressure and high temperature in the absence of oxygen into a gas product which can be used to generate electricity or steam.	Established	Gasification is a proven technology for treatment of several waste streams.

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Technology	Description	Status	Relevance in Ireland
Gas Phase Chemical Reduction (GPCR)	The process involves the chemical reduction of organic compounds, such as PCBs, dioxins and POPs, by hydrogen at 875°C to methane, hydrogen chloride and small amounts of low molecular weight hydrocarbons.	Established	The technology is costly to operate and not cost-effective for low strength waste or small scale operations. Given the high costs, the technology is likely to be first employed on difficult waste streams such as POPs and chlorinated solvents, of which Ireland currently produces limited quantities. Were the technology to become available at commercial scale in EU countries it could offer a treatment avenue for chlorinated wastes from Ireland to compete with incineration.
Molten Metal	A molten metal bath causes the dissociation of the hazardous waste into its elements, which dissolve in the liquid metal solution. Adding co-reactants and/or controlling the operating conditions can produce products of commercial value. All waste types with the exception of soil, sludges and other solids with high mineral content.	Emerging	This process is applicable to wastes which are in reasonably homogeneous phases. Wastes comprising predominantly inert material such as soil cannot be treated. The technology is costly to operate due to significant volumes of off-gases that require treatment using conventional gas cleaning systems, which involve considerable capital cost.
Molten Slag	Waste is mixed with steelworks dust and fluxing agents, which is dried and then fed on to molten iron in an electric arc smelter. The metal oxides are reduced to metals and the organic materials are converted to their basic elements.	Promising	This technology has not been proven.
Molten Salt Oxidation (MSO)	Molten Salt Oxidation is a thermal treatment process for hazardous waste, which oxidises the organic material while retaining the inorganic material in the salt. Organic liquids (high and low volatility) and other materials with a significant organic content. Inert waste is not suitable for treatment in the molten salt system.	Established	Generally, the cost of treatment with this technology is relatively high because of the high capital cost of the equipment, the labour requirements and the high energy cost. Given high costs, the technology is likely to be first employed on difficult waste streams such as POPs and chlorinated solvents, of which Ireland produces limited quantities.
PCB Gone	The process reduces the concentration of PCB in transformer oil by dechlorination.	Established	The process is limited to transformer oils. It is unlikely that the quantities generated in Ireland will make a facility cost-effective.

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Technology	Description	Status	Relevance in Ireland
Plasma Arc Technologies (PACT / PWC / Plascon)	The Plasma Arc process involves the use of high temperatures to destroy feed material. Organic material is vaporised and decomposed by the heat and then ionised by the air. Inorganic material is vitrified.	Established (Plascon), Emerging (PWC), Transition (Pact)	The technology is costly to operate and not cost-effective for low strength waste or small scale operations. Were the technology to become available at commercial scale in EU countries it could offer a treatment avenue for asbestos and fly ash from Ireland to compete with landfilling.
Supercritical Water Oxidation (SCWO)	SCWO destroys organic hazardous waste at temperatures and pressures above the waste's thermodynamic critical point. Under these conditions the water becomes fluid causing the chlorinated hydrocarbons to become soluble and the salts to precipitate out. This technology is limited to the treatment of waste which is liquid or has a particle size less than 200 µm and is most applicable to wastes with an organic content of less than 20%.	Emerging	Due to the limitation in waste accepted by the technology, it is unlikely that the quantities generated in Ireland will make a facility cost-effective.
Solvated Electron Technology	The process involves mixing anhydrous ammonia with the hazardous waste producing a solvated electron solution. The solvated electrons bond to the ions of the contaminated material neutralising the waste.	Emerging	Ireland currently produces a limited amount of the relevant POPs and is therefore unlikely to be a relevant location for the application of this technology at commercial scale.
Steam Detoxifier	High temperature steam (100 -1500°C) is used to destroy waste. Vent gases are carbon dioxide and water. This technology is mainly limited to the treatment of liquid or aqueous wastes.	Promising	Limited data available on this technology
Thermal Desorption	The process involves the physical separation under temperature ranging from 90 to 650°C of volatile and semi-volatile contaminants from soils, sediments, slurries, and filter cakes.	Established	This technology is relevant in the Irish context as it can treat a wide range of contaminants and the system can be mobile. After treatment, additional soil processing may be required.
Alkaline Hydrolysis	A metal hydroxide-based solution reacts with contaminated bone meal, animal-by-products, bovine risk material, hospital cytotoxic wastes to break down the major constituent of cells and tissues.	Established	This technology is relevant in the Irish context as a localised solution to treat animal or human tissues. Processing capacity may be limited.
CEROX and Silver II	Mediated electro-chemical oxidation.	Promising	No commercial experience of this technology

APPENDIX E - Radioactive waste

The Radiological Protection Institute of Ireland (RPII) is the Competent Authority in Ireland with responsibility for, *inter alia*, the licensing and regulation of radioactive sources. Since the establishment of the radiological licensing framework in 1977, the RPII (and its predecessor the Nuclear Energy Board) has expressed concern at the lack of indigenous infrastructure to deal with radioactive waste arising from the legitimate use of radioactive sources in Ireland.

Since the early 1990s licences for the custody and use of radioactive sources have only been granted by the RPII where a "take-back" agreement has been entered into with the supplier. This policy was adopted with a view to minimising the amount of radioactive waste to be managed in Ireland once sources are no longer required. While this approach is not without some problems, it has worked reasonably well in the intervening period. However, as radioactive sources had been in use or custody in Ireland for many decades prior to the adoption of this policy, there are a significant number of legacy sources that are of no further use and these remain without a return or disposal route in Ireland.

In October 2011, it was established that there were 3292 radioactive sources in Ireland held by 85 licensees with half-lives greater than ten years for which no further use was foreseen. Such sources require significant management in terms of safety and security until a central waste storage facility is established or a disposal route is identified. In addition, there were also other sources of less radiological concern but with similar difficulties in terms of storage and disposal. These included technetium-99m generator cores held by hospitals (accumulated by nuclear medicine departments during the 1970s and 1980s when no return route for these generators existed), small disused sources and thorium and uranium compounds held by post-primary schools. While responsibility for radioactive sources clearly rests with licensees, the safety and security of sources, particularly when they have a high radioactive content and/or are no longer in use, give rise to a heightened level of concern. This concern is reflected internationally where the potential for the diversion of such sources for malevolent purposes is now under active consideration. In addition, some of the most lethal radiological accidents globally have involved disused sources falling out of regulatory control and have resulted in the loss of life as well as widespread radioactive contamination of the environment.

Ireland does not have a national storage facility to assist in the management and storage of radioactive waste and disused sources as well as those that are occasionally discovered – the so called 'orphan' sources. The RPII has long identified the lack of such a facility as a serious gap in the current waste management infrastructure with potential implications for safety and security. In response to these concerns, in December 2010 the Government adopted a national policy on radioactive waste management for Ireland. Two of the key initiatives under this policy are the establishment of a centralised storage facility for interim storage and management of radioactive waste and residual sources, and the roll out of a co-ordinated and phased Inventory Reduction Programme to reduce the inventory of disused sources. The Reduction Programme commenced in 2011 with lead State Agencies and Government departments tasked with driving source disposal programmes within their respective sectors. Between 2011 and 2013 approximately 99% of all disused sources with half-lives greater than ten years were successfully exported out of Ireland to disposal and recycling facilities in Europe and the USA. In addition, almost 5600 spent technetium-99m generator cores were also disposed of during 2012 and 2013. Figure 13, which shows the amount of disused sources held within the various sectors, clearly illustrates the substantial progress made on this initiative since 2008.

The Government has also agreed an operational protocol for seized and orphan sources which sets out responsibilities for RPII, Government departments and key stakeholders to ensure that these sources are dealt with in a safe and secure manner.

However, with the transposition in August 2013 of the Euratom Waste Directive (Council Directive 2011/70/Euratom) into national legislation, it is no longer possible to export radioactive waste or disused sources to overseas facilities for disposal. Instead, only material that can be recycled or reused can be exported. In the absence of a national storage facility, this restriction on what can be exported out of Ireland will create difficulties for any future seized, orphan or disused radioactive sources where take back agreements are not honoured or are not deemed suitable for recycling or re-use, requiring them to be safely managed within Ireland.

In line with Government policy enunciated in December 2010, the RPII reiterates its long held view that a central radioactive waste storage facility be established as soon as possible in Ireland for the interim storage and management of radioactive waste materials.

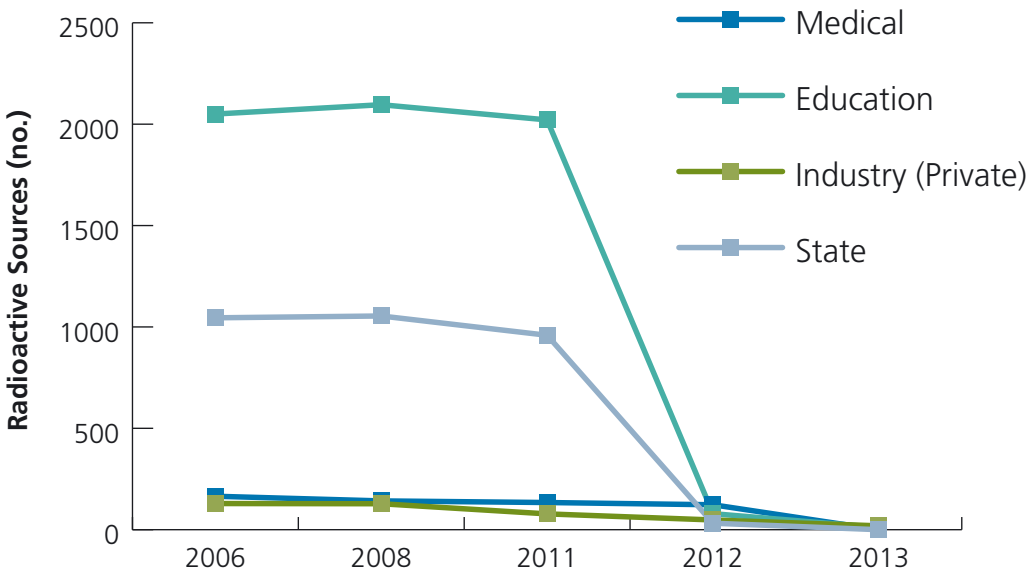

Figure 13 Disused source inventory by sector (half-life >10 yr)

APPENDIX F - Estimated Unreported Waste

Table 33 Characteristics and estimated scale of unreported hazardous waste

Hazardous waste category	Characteristics	Estimated unreported in 2006 (tonnes)	Updated position (e.g. 2011 data, where available)
Paint and ink packaging	Unused or surplus paint and ink from households, trade and industry. A poor collection infrastructure for householders and the trade contributes to the problem. (Deco-paints Regulations reduce solvent content and may reduce quantity of waste).	7,513	1,448 tonnes collected at civic amenity sites, 4,713 tonnes exported.
Small batteries[118]	Certain waste portable (consumer) batteries and button cells are hazardous waste, such as nickel-cadmium batteries and mercury cells. During collection these are usually mixed with non-hazardous batteries such as alkaline batteries, leading to hazardous waste class.	1,496[119]	2,096 tonnes portable batteries placed on market in 2011. 600 tonnes collected in 2011.
Spent sheep dip	Sheep dips used to control ectoparasites in sheep are based on two main chemical substances, organophosphates and cypermethrin. Approx. 20,195 tonnes of waste sheep dip is generated per annum in Ireland, 85% is organophosphate based, the remaining 15% being cypermethrin. This waste sheep dip is currently landspread in accordance with guidance issued by the DAFM under cross-compliance[120].	3,600	20,195 tonnes generated per year (based on average over a three year period. Data sourced from information provided by the Irish Medicines Board).
Fluorescent lamps	Tubes and compact fluorescent lamps (CFLs – low energy bulbs). (Fluorescent lamps contain mercury.)	2,267	1,049 tonnes placed on market; 392 tonnes lamps collected, 119 tonnes exported.
Waste oils	Used engine and machine lubrication oil from garages, industry, DIY, maintenance, etc.	2,000	328 tonnes waste mineral oils & filters collected at civic amenity sites, 633 tonnes waste oil exported. 30 tonnes oily sludges exported.

118 The Batteries Directive (2006/66/EC) provides three classes of batteries including portable batteries, automotive batteries and industrial batteries

119 The figure indicated in the previous plan (5,361 tonnes) has been revised as more data are available for this year.

120 Department of Agriculture and Food. 2005. The Single Payment Scheme – Guide to Cross Compliance. Under cross-compliance, inspections are carried out by the DAFM for compliance with the Ground Water Directive (Statutory Management Requirement SMR 2) for the management of sheep dip.

Hazardous waste category	Characteristics	Estimated unreported in 2006 (tonnes)	Updated position (e.g. 2011 data, where available)
Oil filters	Vehicle oil filters from the servicing of road vehicles.	362	Civic amenity site collections as above, 654 tonnes exported.
Solvents	From dry cleaners (perchlorethylene or "perc") and other small scale commercial users. Solvent Regulations have much improved management of product and waste.	220	171 tonnes PERC imported, 100 tonnes used in dry cleaning.
Lead acid batteries	Originating from garages, farms, households and other industrial applications. Lead is recovered from lead acid batteries for its market value.	177	12,522 tonnes placed on market; 15,374 tonnes exported as per Batteries Regulations.
Dental amalgam	Dental amalgam contains mercury.	0.5	International treaty on the control of mercury agreed in 2013.
Other household hazardous waste	A range of hazardous wastes can be put in domestic bins and end up in landfill. For example, household chemicals, garden chemicals, cleaning agents, medicines and other materials.	4,890	201 tonnes collected at civic amenity sites.
Other agricultural hazardous waste	Comprising oily wastes, animal health care wastes, machinery waste, contaminated packaging, paints and batteries.	3,218	UK Model/Eurostat waste estimates based on 2010 data (tonnes): End-of-life machinery/ tractors: 4,077 Waste oils (engine and hydraulic): 1,697 Batteries: 366 Waste metal oil drums: 70 Animal healthcare waste: 23 CFC containing waste equipment: 8.
Other office and commercial waste	A wide range of product wastes, batteries, fluorescent lamps, printer inks and toner, cleaning agents, and other wastes.	280	WEEE and Batteries Regulations have much improved collection rates.
Total estimated generation of unreported hazardous waste		**26,024 tonnes**	**?- Incomplete Dataset**

Unreported hazardous waste is estimated by a number of methodologies:

- *Mass flow analysis:* There is a direct relationship between the use of certain products and the amount of hazardous waste that arises as a result of their use. Central Statistics Office data on imports and exports, combined with data on indigenous production, allows estimates to be made of the sale of certain products and hence the likely level of waste generation (e.g. lubrication oil).
- *Examination of hazardous waste arisings in other countries:* For some sectors, no comprehensive records exist in Ireland and quantities were estimated from factors derived from international data.
- *Other methodologies:* Use is made of data from a wide variety of sources, and of specific studies carried out on certain products or hazardous waste streams.

An Ghníomhaireacht um Chaomhnú Comhshaoil

Is í an Gníomhaireacht um Chaomhnú Comhshaoil (EPA) comhlachta reachtúil a chosnaíonn an comhshaol do mhuintir na tíre go léir. Rialaímid agus déanaimid maoirsiú ar ghníomhaíochtaí a d'fhéadfadh truailliú a chruthú murach sin. Cinntímid go bhfuil eolas cruinn ann ar threochtaí comhshaoil ionas go nglactar aon chéim is gá. Is iad na príomh-nithe a bhfuilimid gníomhach leo ná comhshaol na hÉireann a chosaint agus cinntiú go bhfuil forbairt inbhuanaithe. Is comhlacht poiblí neamhspleách í an Ghníomhaireacht um Chaomhnú Comhshaoil (EPA) a bunaíodh i mí Iúil 1993 faoin Acht fán nGníomhaireacht um Chaomhnú Comhshaoil 1992. Ó thaobh an Rialtais, is í an Roinn Comhshaoil, Pobal agus Rialtais Áitiúil.

ÁR bhFREAGRACHTAÍ

CEADÚNÚ

- Bíonn ceadúnais á n-eisiúint againn i gcomhair na nithe seo a leanas chun a chinntiú nach mbíonn astuithe uathu ag cur sláinte an phobail ná an comhshaol i mbaol:
- áiseanna dramhaíola (m.sh., líonadh talún, loisceoirí, stáisiúin aistrithe dramhaíola);
- gníomhaíochtaí tionsclaíocha ar scála mór (m.sh., déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta);
- diantalmhaíocht;
- úsáid faoi shrian agus scaoileadh smachtaithe Orgánach Géinathraithe (GMO);
- mór-áiseanna stórais peitreail;
- scardadh dramhuisce;
- dumpáil mara.

FEIDHMIÚ COMHSHAOIL NÁISIÚNTA

- Stiúradh os cionn 2,000 iniúchadh agus cigireacht de áiseanna a fuair ceadúnas ón nGníomhaireacht gach bliain.
- Maoirsiú freagrachtaí cosanta comhshaoil údarás áitiúla thar sé earnáil aer, fuaim, dramhaíl, dramhuisce agus caighdeán uisce.
- Obair le húdaráis áitiúla agus leis na Gardaí chun stop a chur le gníomhaíocht mhídhleathach dramhaíola trí comhordú a dhéanamh ar líonra forfheidhmithe náisiúnta, díriú isteach ar chiontóirí, stiúradh fiosrúcháin agus maoirsiú leigheas na bhfadhbanna.
- An dlí a chur orthu siúd a bhriseann dlí comhshaoil agus a dhéanann dochar don chomhshaol mar thoradh ar a ngníomhaíochtaí.

MONATÓIREACHT, ANAILÍS AGUS TUAIRISCIÚ AR AN GCOMHSHAOL

- Monatóireacht ar chaighdeán aeir agus caighdeáin aibhneacha, locha, uiscí taoide agus uiscí talaimh; leibhéil agus sruth aibhneacha a thomhas.
- Tuairisciú neamhspleách chun cabhrú le rialtais náisiúnta agus áitiúla cinntí a dhéanamh.

RIALÚ ASTUITHE GÁIS CEAPTHA TEASA NA HÉIREANN

- Cainníochtú astuithe gáis ceaptha teasa na hÉireann i gcomhthéacs ár dtiomantas Kyoto.
- Cur i bhfeidhm na Treorach um Thrádáil Astuithe, a bhfuil baint aige le hos cionn 100 cuideachta atá ina mór-ghineadóirí dé-ocsaíd charbóin in Éirinn.

TAIGHDE AGUS FORBAIRT COMHSHAOIL

- Taighde ar shaincheisteanna comhshaoil a chomhordú (cosúil le caighdéan aeir agus uisce, athrú aeráide, bithéagsúlacht, teicneolaíochtaí comhshaoil).

MEASÚNÚ STRAITÉISEACH COMHSHAOIL

- Ag déanamh measúnú ar thionchar phleananna agus chláracha ar chomhshaol na hÉireann (cosúil le pleananna bainistíochta dramhaíola agus forbartha).

PLEANÁIL, OIDEACHAS AGUS TREOIR CHOMHSHAOIL

- Treoir a thabhairt don phobal agus do thionscal ar cheisteanna comhshaoil éagsúla (m.sh., iarratais ar cheadúnais, seachaint dramhaíola agus rialacháin chomhshaoil).
- Eolas níos fearr ar an gcomhshaol a scaipeadh (trí cláracha teilifíse comhshaoil agus pacáistí acmhainne do bhunscoileanna agus do mheánscoileanna).

BAINISTÍOCHT DRAMHAÍOLA FHORGHNÍOMHACH

- Cur chun cinn seachaint agus laghdú dramhaíola trí chomhordú An Chláir Náisiúnta um Chosc Dramhaíola, lena n-áirítear cur i bhfeidhm na dTionscnamh Freagrachta Táirgeoirí.
- Cur i bhfeidhm Rialachán ar nós na treoracha maidir le Trealamh Leictreach agus Leictreonach Caite agus le Srianadh Substaintí Guaiseacha agus substaintí a dhéanann ídiú ar an gcrios ózóin.
- Plean Náisiúnta Bainistíochta um Dramhaíl Ghuaiseach a fhorbairt chun dramhaíl ghuaiseach a sheachaint agus a bhainistiú.

STRUCHTÚR NA GNÍOMHAIREACHTA

Bunaíodh an Ghníomhaireacht i 1993 chun comhshaol na hÉireann a chosaint. Tá an eagraíocht á bhainistiú ag Bord lánaimseartha, ar a bhfuil Príomhstiúrthóir agus ceithre Stiúrthóir. Tá obair na Gníomhaireachta ar siúl trí ceithre Oifig:

- An Oifig Aeráide, Ceadúnaithe agus Úsáide Acmhainní
- An Oifig um Fhorfheidhmiúchán Comhshaoil
- An Oifig um Measúnacht Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáide

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag ball air agus tagann siad le chéile cúpla uair in aghaidh na bliana le plé a dhéanamh ar cheisteanna ar ábhar imní iad agus le comhairle a thabhairt don Bhord.

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

ENVIRONMENTAL PROTECTION AGENCY

An Ghníomhaireacht um Chaomhnú Comhshaoil

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