
Municipal Solid Waste – Pre-treatment & Residuals Management

An EPA Technical Guidance Document



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, Heritage and Local Government.

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- 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);
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- 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).

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- 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.

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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 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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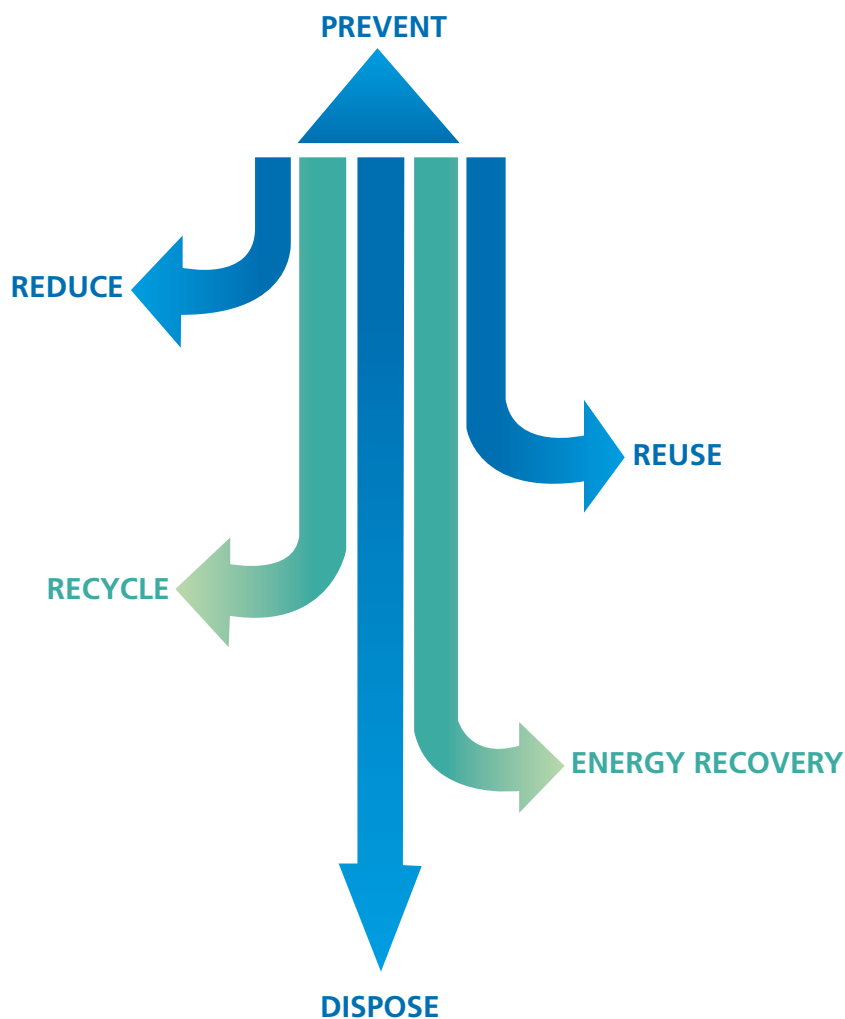
FOREWORD

This guidance document is published following wide consultation with stakeholders and consideration of submissions received on the consultation document which was published in September 2008. The submissions raised a number of issues and concerns which are reflected in the final guidance where appropriate.

Individual submissions and EPA consideration of these submissions is available under separate cover on the EPA website.

This guidance note will bring greater clarity as to what is expected in relation to waste pre-treatment obligations for landfill and incineration. The implementation of this guidance will reduce the environmental burden of landfills and will act to assist delivery of Ireland's obligations under EU legislative obligations.

Following publication of this guidance the EPA will review the waste licences for the operational municipal solid waste landfills in Ireland and adjust conditions therein in respect of waste acceptance criteria.



Municipal Solid Waste – Pre-treatment & Residuals Management

An EPA Technical Guidance Document

INTRODUCTION

The purpose of this document is to set out the Environmental Protection Agency (EPA) standard for minimum acceptable pre-treatment for Municipal Solid Waste accepted for landfilling or incineration at EPA licensed waste activities. The guidance set out in this document is intended to assist the delivery of Ireland's obligations under the EU Waste Framework Directive (2006/12/EC), the EU Landfill Directive (1999/31/EC), and the EU IPPC Directive (96/61/EC), including national policy as articulated in the National Biodegradable Waste Strategy (DoEHLG, 2006).

The guidance requires operators of landfill and incineration facilities to demonstrate via their waste acceptance policy (as established by licence conditions) that waste accepted at these facilities has been subjected to appropriate pre-treatment. This guidance supports government policy in respect of the role of source segregated waste collection. The EPA believes that such collection is best placed to maximise waste recovery options and recycles value, as well as ensuring diversion of biodegradable waste from landfill. The EU Landfill Directive has established escalating obligations for biodegradable waste landfill diversion which are also taken into account in this guidance. In respect of landfill facilities, achievement of the pre-treatment obligations will assist mitigation of odour nuisance; will reduce the aftercare burden for such facilities; and will reduce greenhouse gas emissions.

BACKGROUND

This guidance document is issued by the EPA as associate guidance in support of its formal sectoral guidance notes on the determination of national Best Available Techniques (BAT) for the waste sector (Landfill BAT, Waste Transfer BAT, Composting BAT, etc.). In particular, this guidance addresses aspects of municipal solid waste pre-treatment for waste landfilling, waste incineration and waste treatment industries.

This guidance provides a framework for decision making in relation to the achievement of national and European legislative and policy obligations, in particular those obligations in the *Landfill Directive* (1999/31/EC) regarding waste acceptance and pre-treatment. These obligations were implemented in Ireland via, *inter alia*, Section 40(4)(bb) of the Waste Management Acts 1996-2008, Articles 49(5) and 52 of the Waste Management (Licensing) Regulations 2004 (SI No. 395), and in the National Biodegradable Waste Strategy (DoEHLG, 2006) (refer Figure 1). For waste-to-energy incineration

activities this document similarly provides a basis for evaluation of the waste acceptance policy against the obligations under BAT, as well as under EU waste policy. The essential objectives of waste pre-treatment are to enhance recycling and recovery of resources, and to reduce the environmental pollution potential of waste residuals disposed to landfill.

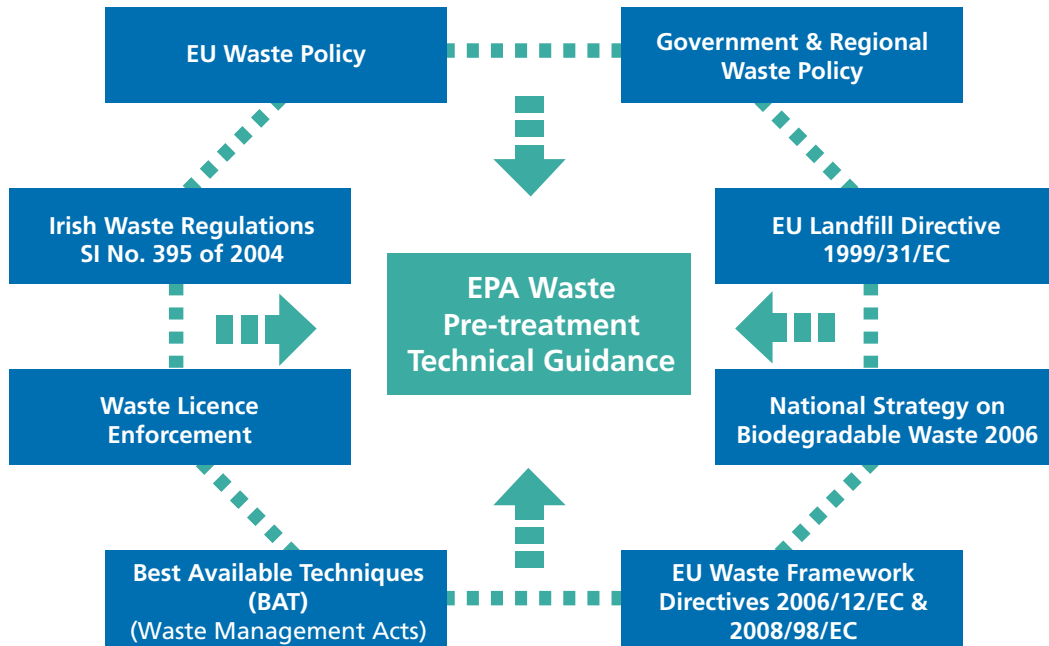


Figure 1: Regulatory context for EPA MSW Waste Pre-treatment guidance note

This guidance document will be periodically reviewed and updated as required to reflect any changes in technologies, legislation and/or policy in order to incorporate advances or directions as they arise. Treatment techniques and standards identified in this guidance document are considered best practice at the time of writing.

BEST AVAILABLE TECHNIQUES (BAT)

BAT was introduced as a key principle in the *IPPC Directive (96/61/EC)*. This Directive has been transposed into Irish law by the *Protection of the Environment Act 2003*. This implementing legislation extended the concept of BAT to all facilities authorised under the *Waste Management Acts (WMA) (1996-2008)*, regardless of whether or not they were included in Annex I of the IPPC Directive. Thus, for activities regulated by these Acts, BAT must be applied. BAT is defined in Section 5(2) of the *WMA 1996-2008*.

Section 40(4) of the *WMA 1996-2008* imposes a prohibition on the grant of a licence unless the EPA is satisfied, *inter alia*, that appropriate BAT controls will be identified and used for specified waste activities in order to prevent emissions, and to protect human health and the environment from pollution. The essence of BAT is that the selection of techniques to protect the environment should achieve an appropriate balance between realising environmental benefits and the costs incurred by the person carrying on the activity. In the identification of BAT, emphasis is placed on

pollution prevention techniques, including *cleaner technologies* and *waste minimisation*, rather than end-of-pipe treatment.

In determining BAT, applicants for waste licences must also demonstrate that due account has been taken of:

- the hierarchy for waste management, including waste prevention as the priority, followed by waste reuse, recovery and finally safe disposal of any remaining non-recoverable wastes; and
- relevant waste management plans.

EU WASTE POLICY

Following on from the implementation of the EU Waste Framework Directive in 1977¹, the European Commission set out its Community-wide waste policy in the *Community Strategy for Waste Management of 1989* (SEC(89) 934 Final 1989). This document, which has its foundations in the EU Waste Framework Directive, is the cornerstone of European waste policy. A revised version of the strategy was adopted by the Commission in July 1996. Central to EU policy was the articulation of a waste hierarchy (Figure 2): this hierarchy gives substance to the obligations set out in Article 3 of the Waste Framework Directive. Drawing on the precautionary principle, the waste hierarchy prioritises the prevention and reduction of waste, then its reuse and recycling and lastly the optimisation of its final disposal. The concept is often described by the “4Rs” – Reduce, Reuse, Recycle, and Recover; followed by unavoidable disposal.

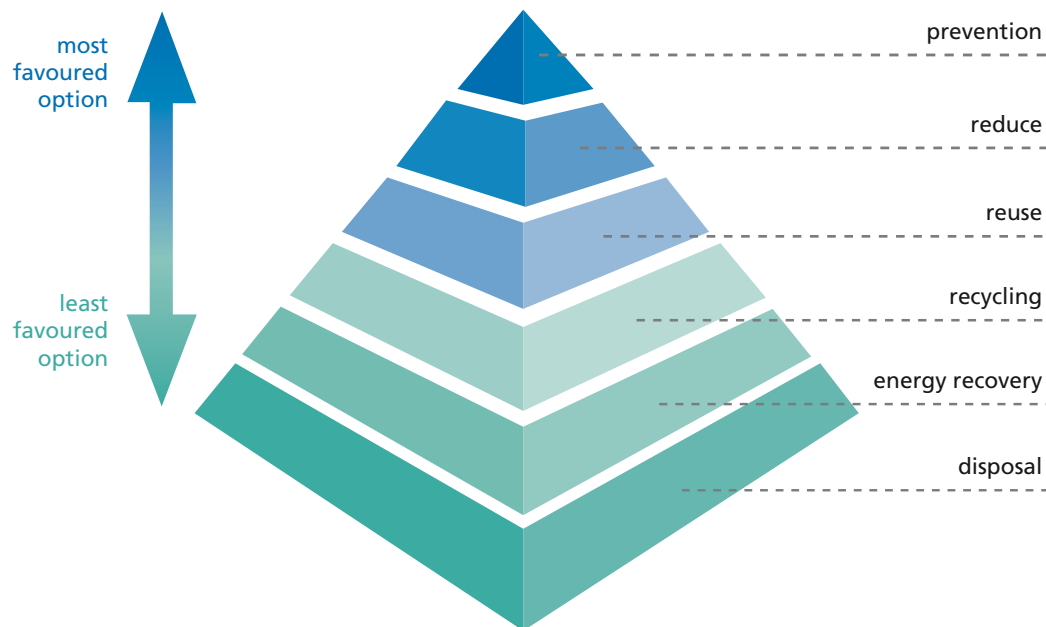


Figure 2. *EU Waste Hierarchy*

¹ Directive 75/442/EEC, subsequently replaced by the re-codified edition, Directive 2006/12/EC.

The hierarchy encourages the adoption of options for managing waste in the following order of priority:

- Waste should be prevented or reduced at source where possible;
- Where waste cannot be prevented, waste materials or products should be reused directly, or refurbished then reused;
- Waste materials should then be recycled or reprocessed into a form that allows them to be reclaimed as a secondary raw material;
- Where useful secondary materials cannot be reclaimed, the energy content of waste should be recovered and used as a substitute for non-renewable energy resources;
- Only if waste cannot be prevented, reused (including refurbishment and reclamation) or recovered, should it be disposed of into the environment by landfilling, and this should only be undertaken in a controlled manner.

This hierarchy is given further authority in the revised Waste Framework Directive (2008/98/EC, required to be transposed by 12-12-2010) where it is incorporated into the legislation as a legal obligation for Member States (*c.f.* Article 4). Moreover, the text of the revised Waste Framework Directive (WFD) empowers the Commission to bring forward specific targets for recycling and recovery of different waste streams (over and above those currently published such as for packaging waste and WEEE).

The final text of the revised EU WFD requires a MSW recycling rate of 50% by 2020.

EU LANDFILL DIRECTIVE OBLIGATIONS (1999/31/EC)

This Directive, which came into effect on 16th July 2001, was transposed into Irish law through SI No. 336 of 2002² and SI No. 337 of 2002³. These Regulations were later replaced by the Waste Management (Licensing) Regulations 2004 (SI No. 395 of 2004). The EU Landfill Directive, amongst other matters, sets out a number of obligations in relation to waste acceptance at different classes of landfills. One of the main acceptance obligations is that operators of landfills are not permitted to accept waste unless it has been pre-treated (including diversion). These waste diversion and pre-treatment obligations are set out in Articles 5 & 6 of the Landfill Directive (1999/31/EC).

In accordance with Article 6 of the Landfill Directive and via the obligations in their waste licences, landfill operators are expected to be able to demonstrate that all waste accepted at the landfill has been subjected to pre-treatment. **This is binding from 16th July 2001 for any facilities commenced since that date; and imposes a binding obligation effective on the 16th July 2009 for all landfill facilities operational at the time of transposition of the Directive (16th July 2001).**

2 Waste Management (Licensing)(Amendment) Regulations 2002.

3 European Communities (Amendment of Waste Management (Licensing) Regulations 2000) Regulations 2002.

Article 5 of the Directive sets out a requirement for Member States to establish a national strategy for the reduction of biodegradable waste going to landfills. In addition this Article sets out specific pre-treatment obligations for Biodegradable Municipal Waste (BMW). These BMW diversion obligations are a sub-set of the waste treatment requirements, and have specific limitations in respect of the tonnage of BMW that can be accepted at landfills. These limitations – which are tied to a 1995 statistical base year for waste production in Ireland⁴ – are staggered, with each iteration possessing a stricter obligation in relation to diversion. Ireland negotiated with the EU Commission a four-year extension to the first two compliance dates specified in Article 5 (2006 to 2010, and 2009 to 2013 respectively)(refer the National Biodegradable Waste Strategy, 2006). These obligations can be summarised as follows (refer also Figures 3 and 5):

- By 1st January 2010 Ireland can only landfill a maximum 75% of the BMW generated in 1995, i.e. a national maximum of 967,443t BMW can be landfilled.
- By 1st January 2013 Ireland can only landfill a maximum 50% of the BMW generated in 1995, i.e. a national maximum of 644,956t BMW can be landfilled.
- By 1st January 2016 Ireland can only landfill a maximum 35% of the BMW generated in 1995, i.e. a national maximum of 451,469t BMW can be landfilled.

In connection with these obligations it should be noted that Article 22 of the new EU Waste Framework Directive (2008/98/EC) requires Member States to take measures to encourage the separate collection and treatment of biowaste and the marketing of biowaste derived products.

IRISH WASTE POLICY

In Ireland a comprehensive policy framework for modernising the approach to waste management was put in place in 1998 in the form of the Policy Statement *Waste Management: Changing our Ways*. In summary, the policy was based on the “integrated waste management” approach, having regard to the internationally adopted hierarchy of options (articulated above). The policy context was strengthened in 2002 with the publication of *Preventing and Recycling Waste: Delivering Change* and again in 2004 with the publication of *Waste Management – Taking Stock and Moving Forward*.

This policy has been underwritten by a range of regulatory instruments which significantly influence how waste streams are regulated and managed in Ireland. These legal instruments directly influence the market in relation to how products are made, to how they are managed at end of life (e.g., Waste Management Acts 1996-2008, Landfill Tax, Plastic Bag Levy, WEEE Regulations, Restriction of use of Hazardous Substances Regulations, Waste Oils Regulations, Waste Tyre Regulations, PCB Regulations, etc.). There is a large body of waste management legislation that tackles the issue of waste from a generic perspective, as well as a waste stream perspective, and a substance perspective. Many of the recent legislative initiatives have been addressed to producer responsibility (e.g. WEEE, End of Life Vehicles, Tyres, Packaging, etc.). In addition to the legislative initiatives, government has developed policy and guidance on national best practice (e.g. *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Waste Projects* were published in July 2006). Government has also developed policy that addresses EU waste management requirements such as that for biodegradable waste management⁵.

4 National Waste Database Report for report year 1995, EPA 1996.

5 The National Strategy on Biodegradable Waste, April 2006. DoEHLG.

BMW Generation – Baseline (1995)

		Quantity generated (tonnes)
1995		1,289,911

BMW Landfilled – Current Position

		Quantity landfilled (tonnes)
2004		1,304,426
2005		1,307,570
2006		1,422,432
2007		1,475,077

BMW Landfill Obligations

Year	Landfill Directive Obligations	Maximum quantity allowed to be landfilled (tonnes)
2010	75% of quantity generated in 1995	967,433
2013	50% of quantity generated in 1995	644,956
2016	35% of quantity generated in 1995	451,469

Figure 3: National obligations for BMW diversion from landfill (Source: EPA⁶)

A final significant element of policy that is important in relation to the management of waste in Ireland is that articulated in the National, Regional and Local Waste Plans. These are important documents in relation to understanding the required waste management obligations as well as ambitions on a local, regional or national scale.

National Strategy on Biodegradable Waste

The National Strategy on Biodegradable Waste⁵ sets out measures to progressively divert biodegradable municipal waste from landfill in accordance with the obligations specified in EU Directive 1999/31/EC on the landfill of waste. This is a significant policy statement in relation to this waste stream.

The fundamental principles of the national strategy can be summarised as follows:

- employment of a combination of instruments to promote waste reduction, including awareness measures, economic incentives, and regulatory measures;
- continuing to develop an integrated waste system building on proposals and policies in regional waste management plans and strengthening these where necessary;
- emphasis on source separation of biodegradable wastes by the producer, followed by separate collections by the collector, enabling high quality recyclables to be recovered;

6 National Waste Report for the Year 2006 (EPA 2007); & Year 2007 (EPA 2009).

- striving to maximise the recovery of materials firstly, and energy secondly as a sustainable means of treating waste, rather than diverting from landfill to other forms of disposal; and
- developing partnerships with other sectors (industry, agriculture, fisheries etc.) enabling cost-effective treatment systems, suited to Irish conditions, to be established.

The initiatives set out in this technical guidance document apply this stated policy in respect of waste facilities licensed by the EPA. Figure 4 summarises the strategy approach.

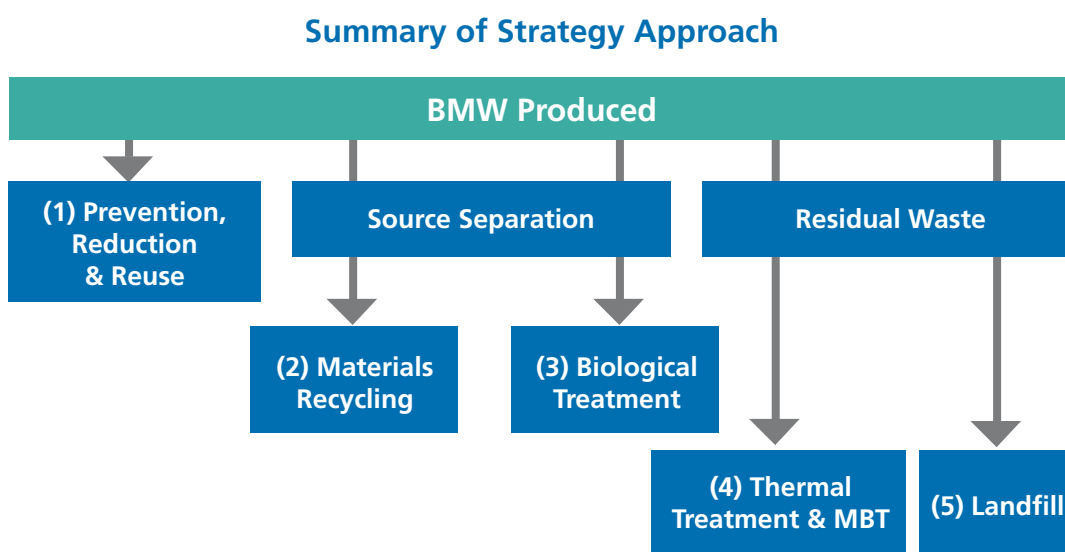


Figure 4: Summary of national Biodegradable Waste Strategy approach (DoEHLG, 2006)

EPA GUIDANCE & STATISTICS

The recently published EPA discussion document on national BMW objectives *Hitting the Targets for Biodegradable Municipal Waste: Ten Options for Change*⁷ reaffirms the pressing need for the State to grapple with this issue of diversion. That discussion document – in the context of the requirements of the EU Landfill Directive (1999/31/EC) – reviews the way Ireland currently manages the Organic Fraction of BMW (OFBMW). The intention of the discussion document is to broaden the public discussion to include wider market issues, rather than focus solely on narrower topics such as specific technologies. The discussion document suggests ten possible public policy interventions to encourage changes in management practices for BMW:

1. Promote at-source composting
2. Expand R&D for at-source composting
3. Ban the landfill of untreated municipal waste
4. Increase the landfill levy
5. Undertake market research for treated OFBMW products

⁷ Hitting the Targets for Biodegradable Municipal Waste: Ten Options for Change. Irish EPA, 2008.

6. Provide a subsidy for the treatment of OFBMW
7. Develop and assign responsibility for a national waste management plan
8. Develop guidance on waste infrastructure and contaminated sites
9. Develop stabilised biowaste standards
10. Encourage green procurement and undertake marketing of OFBMW products

Recent EPA statistics⁶ indicate that there is a modest increase in the percentage of BMW that is being sent to landfill (64% in 2007, up from 62% in 2006). However these statistics, as supported by EPA-ESRI ISus projections⁸, also indicate a continuing trend of increasing biodegradable municipal waste generation (Figure 5). These projections indicate that Ireland will deviate significantly from the position required by the EU Landfill Directive and articulated in the National Strategy on Biodegradable Waste (NSBW)⁶, unless urgent action is now taken.

The result of this projected growth indicates large distance-to-target or 'gaps' between the reduction obligations Ireland is required to achieve and predicted waste growth (see Figure 6). This gap analysis will be kept under review as distance-to-target will be dependent on the biodegradable municipal waste generation statistics for years 2008 and 2009, as well as performance of the economy. However it is not expected that there will be any significant data swing in this period.

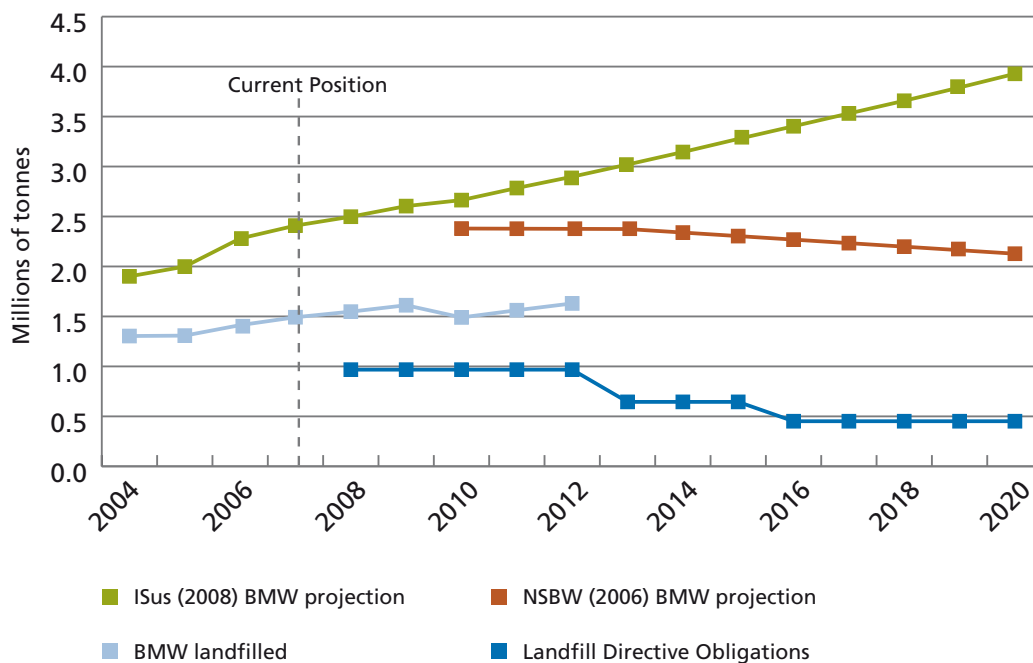


Figure 5: Biological Municipal Waste Forecasts (sources DoEHLG⁶, & EPA-ESRI ISus projections⁸)

⁸ EPA sponsored ERSI research on waste generation projections. Modelling also considers economic downturn. See http://www.esri.ie/research/research_areas/environment/isus/

Year	Maximum quantity of untreated BMW allowed to landfill (rounded)	BMW 'Distance to Objective' (Gap Analysis) (rounded)	
		'Standstill' position (gap) based on 2007 figures	Position (gap) based on ISus ⁸ waste projections
2010	967,000t	508,000t	672,000t
2013	645,000t	830,000t	1,209,000t
2016	451,000t	1,024,000t	1,603,000t

Figure 6: BMW Gap analysis

The NSBW comments that *'the gap represents the amount of biodegradable municipal waste that must be diverted away from landfill in order for our mandatory requirements to be met. It also represents the capacity for alternative treatment methods that must be put in place to deal with biodegradable municipal waste diverted from landfill'*. 'Capacity' will include infrastructural arrangements such as appropriate waste collection, pre-treatment and final processing technologies/infrastructure, as well as 'at home' systems.

The NSBW concludes that the quantities of biodegradable waste diverted from landfill by means of separate collection, materials recycling and biological treatment will not be sufficient to entirely bridge the gap between biodegradable municipal waste generation and the Landfill Directive targets – particularly for the 2013 and 2016 obligations. The NSBW further states that meeting targets will therefore require that the biodegradable proportion of residual waste, which is not suitable for recycling or is not collected separately, will need to be pre-treated prior to landfill.

The operators of landfills will be responsible, under the terms of their EPA licences, to demonstrate that appropriate pre-treatment actions have been applied to accepted waste to the extent necessary to comply with any BMW waste acceptance criteria specified in their licences.

EPA LICENSING

The EPA consistently reflects national and EU policy in the administration of the Waste and IPPC regulatory regimes. Licences issued to date by the EPA specify general requirements for licensees to report on their contribution to national waste policy.

The primary intent of waste acceptance & pre-treatment conditions in a waste licence is twofold:

- 1) the reduction/elimination of disposal of biodegradable waste to landfill – this waste is leachate forming and generates landfill gas which is a harmful greenhouse gas composite, and is also odorous (potentially nuisance forming); and
- 2) the promotion of waste pre-treatment to ensure extraction from the waste disposal stream of recyclable/recoverable resources, including energy.

Such conditions are intended to implement, in particular, recitals 2, 5 & 6⁹ of the EU Waste Framework Directive (2006/12/EC), as well as recitals 2, 8, 16 & 17¹⁰ of the EU Landfill Directive (1999/31/EC). In short, these pre-treatment conditions have a primary objective of achieving a more responsible approach to the management of waste and in particular to a final disposal solution for residual waste, as required.

WHAT IS RESIDUAL WASTE?

In its most basic meaning, a residue is something 'which is left over': which in the case of a process residue is a material left over from a process.

In Canada, a published definition for Residual Waste is given as,

*Common waste generated by industry, business, institutions and houses that remains after diversion programmes have been used to remove recoverable materials.*¹¹

Smith & Scott (2005)¹² define residuals management as,

the management of waste resulting from waste treatment processes.

In Canterbury, New Zealand, residual waste management is defined as,

*the final treatment and/or disposal of a waste that cannot be used in any other way.*¹³

In the Waste Management (Facility Permit and Registration) Regulations 2007 (SI No. 821 of 2007), residual waste is defined – for the purposes of those regulations – in Article 5(2) as meaning:

... any fraction of municipal waste remaining after the source separation of municipal waste fractions such as food and garden waste, packaging, paper, metals, and glass.

9 (2) The essential objective of all provisions relating to waste management should be the protection of human health and the environment against harmful effects caused by the collection, transport, treatment, storage and tipping of waste.

(5) The recovery of waste and the use of recovered materials as raw materials should be encouraged in order to conserve natural resources. It may be necessary to adopt specific rules for reusable waste.

(6) In order to achieve a high level of environmental protection, Member States should, in addition to taking responsible action to ensure the disposal and recovery of waste, take measures to restrict the production of waste particularly by promoting clean technologies and products which can be recycled and reused, taking into consideration existing or potential market opportunities for recovered waste.

10 (2) Whereas the Council resolution of 9 December 1996 on waste policy considers that, in the future, only safe and controlled landfill activities should be carried out throughout the Community.

(8) Whereas both the quantity and hazardous nature of waste intended for landfill should be reduced where appropriate; whereas the handling of waste should be facilitated and its recovery enhanced; whereas the use of treatment processes should therefore be encouraged to ensure that landfill is compatible with the objectives of this Directive; whereas sorting is included in the definition of treatment.

(16) Whereas measures should be taken to reduce the production of methane gas from landfills, *inter alia*, in order to reduce global warming, through the reduction of the landfill of biodegradable waste and the requirements to introduce landfill gas control.

(17) Whereas the measures taken to reduce the landfill of biodegradable waste should also aim at encouraging the separate collection of biodegradable waste, sorting in general, recovery and recycling.

11 Durham – York Region of Ontario Residuals Waste Study 2006.

12 Dictionary of Water and Waste Management. Elsevier Press.

13 <http://www.ecan.govt.nz/Our+Environment/Waste/The+5+Rs/Residual-waste-mgmt.htm>

In the simplest terms, Residual Waste is material left over from a waste pre-treatment/processing step. Accordingly, the character of residual waste will be different depending on the point in the waste management chain that is being examined.

The current national municipal waste recovery rate is 36.5% (c.f. EPA National Waste Report for 2007) which exceeds the '35% by 2013' target set in the Government's 1998 *Changing our Ways* waste policy document. However a higher recovery rate is technically possible, and is now necessary in order to meet EU obligations. The revision to the EU Waste Framework Directive sets out an ambition of 50% recovery for MSW by 2020 (c.f. Article 11 of 2008/98/EC).

The following sections of this guidance document present and discuss the pre-treatment options considered necessary in order to ensure compliance with EPA requirements.

WHAT IS PRE-TREATMENT?

The pre-treatment of waste can include processes such as:

- Source separation (e.g. home composting, packaging waste)
- Separate collections (e.g. '3 bin' systems)
- Diversion to non-disposal waste management routes
- Manual sorting
- Composting
- Energy recovery
- Mechanical treatment (crushing, grading, magnetic separation, eddy current separation, ballistic separation, trommeling, sorting, etc)
- Biological stabilisation of 'black bin' residues (after mechanical treatment)
- Rendering
- Thermal treatment (including pyrolysis)
- Aerobic/anaerobic digestion.

Waste treatment options thus span the following processes: Manual – Mechanical – Biological – Thermal. Acceptable pre-treatment solutions will likely entail a range of these processes.

Assuming prevention steps have been exhausted, then 'at-source' separation techniques – which are a form of treatment – are the next preferred steps where technically possible. As noted in the NSBW, the highest quality recyclables are generated by 'at-source' separation initiatives, where contamination of recyclable components is prevented.

The NSBW⁵ notes that the quantities of waste diverted from landfill by means of separate collection, materials recycling and biological treatment will still not be sufficient to entirely bridge the gap between biodegradable municipal waste generation and the Directive obligations (for the 2016 obligation in particular). The NSBW further states that *'meeting targets will therefore require that a certain proportion of residual biowaste, which is not suitable for recycling or*

biological treatment or is not collected separately, is pre-treated prior to landfill'. Two broad categories of treatment for this material are identified in the Strategy, viz, thermal treatment with energy recovery, and mechanical Biological Treatment (MBT).

Detailed presentation and examination of the mechanical biological treatments available can be found in the UK Juniper Report and in an EPA research report on MBT completed in 2008.^{14, 15} The UK Juniper consultants¹⁴ define MBT operations as the *partial processing of mixed household waste by mechanically removing some parts of the waste and biologically treating others, so that the residual fraction is smaller and more suitable for a number of possible uses*. Article 5(2) of the Waste Management (Facility Permit & Registration) Regulations, 2008 (SI No. 821) defines MBT as *the treatment of residual municipal waste through a combination of mechanical processing and biological stabilisation, in order to stabilise and reduce the volume of waste which requires disposal*. MBT in itself does not result in the final treatment of residual waste.

This document does not intend to present an exhaustive list of all possible waste treatment processes, but rather sets out the guiding principles for the main end-of-life decisions for residuals from the MSW stream. The application of these principles will permit compliance with the waste pre-treatment objectives specified in EU legislation and policy, as well as compliance with EPA waste licence conditions.

MINIMUM PRE-TREATMENT OBLIGATIONS

The two principal residuals management options are Landfill Disposal and Incineration. Within the EU waste hierarchy and policy, incineration with energy recovery is preferred over landfill.

The EPA, in accordance with Section 40(4)(bb) of the Waste Management Acts 1996-2008, and Articles 49(5) and 52(6) of the Waste Management (Licensing) Regulations 2004 (SI No. 395, as amended), shall not grant a licence for a landfill facility unless it is satisfied that the waste pre-treatment requirements of the Landfill Directive can be complied with. The EPA therefore will be imposing conditions in landfill facility licences for the pre-treatment of waste to specific standards. BAT for landfill and incineration facilities will also be determined. The obligations set out in this pre-treatment guidance will assist application of BAT in both regulatory and facility operational processes.

The flow chart presented in Figure 7 will assist in visualising the main pre-treatment/diversion options upstream of incineration and landfill.

Landfill

As stated previously, a landfill operator must be able to demonstrate that waste accepted at the landfill has been subjected to appropriate pre-treatment (c.f. Article 6 of the Landfill Directive). For landfills operational on 16th July 2001¹⁶, the compliance date for this obligation is 16th July 2009;

14 Juniper's major report on MBT was published in the spring of 2005. Publication available via: http://www.juniper.co.uk/services/Our_services/mbt.html

15 Research report entitled 'Critical Analysis of the Potential of Mechanical Biological Treatment for Irish Waste Management'. Volume 2, September 2008, Irish EPA.

16 Date of transposition of the Landfill Directive.

and any landfill that commenced after 16th July 2001 should currently accept only waste that has been pre-treated to an acceptable standard. In addition to this general pre-treatment requirement, the biodegradable waste restrictions articulated in Article 5 of the EU Landfill Directive establish specific pre-treatment objectives for this particular fraction of the MSW stream.

In order to meet the pre-treatment and biodegradable waste diversion obligations set out in the Landfill Directive and having regard to the NSBW as well as the principles of BAT, a landfill operator, through their waste acceptance licence conditions, will be required to demonstrate to the EPA that the level of pre-treatment (incl. diversion) of the waste accepted at the facility is sufficient to ensure compliance with the required diversion obligations¹⁷ (refer Figure 3). In adopting this approach the EPA is implementing national and EU policy and obligations.

As noted in the National Strategy on Biodegradable Waste⁶, there will be a certain amount of biodegradable municipal waste for which it is not feasible to achieve a sufficient level of either at-source composting, or segregated collection (for treatment & recovery), to satisfy the required landfill diversion targets. Accordingly, there will also be a need to collect this material as part of the residual BMW and to provide treatment as may be necessary to ensure achievement of the escalating obligations under the Landfill Directive, in particular the 2016 obligation.

The minimum pre-treatment obligations for waste intended to be accepted at MSW landfills are articulated as follows (refer Figure 8 also):

- The operator of an existing landfill¹⁸ must demonstrate to the EPA that, **by 16th July 2009, all¹⁹ waste delivered to the landfill will have been adequately pre-treated**. This must include treatment of the biodegradable component of the waste received to the extent necessary to achieve the escalating obligations (for 2010, 2013 & 2016).
- The operator of a new landfill (including major extensions of same) must demonstrate to the EPA that **from commencement of operation, all¹⁹ waste delivered to the landfill will have been adequately pre-treated**. This must include treatment of the biodegradable component of the waste received to the extent necessary to achieve the escalating obligations (for 2010, 2013 & 2016). This is considered minimum BAT for such new facilities.

The minimum acceptable pre-treatment for MSW landfills would consist of a source separated collection system (2 bin or equivalent). For urban areas (>1,500 population) diversion or separate collection of biowaste (i.e. 3rd bin) is expected. Biological treatment of the residual 'black bin' (from 2 or 3 bin collections) will in all likelihood be necessary in relation to achievement of the 2016 diversion/treatment obligation. If a 2 or 3 bin system is not available/availed of, the waste must be subject to adequate mechanical and biological treatment – configured to achieve at least an equivalent (to a 3 bin system) landfill diversion/pre-treatment.

The minimum treatment obligations set out in Figure 8 for biodegradable waste treatment reflect the national strategy for biodegradable waste and Landfill Directive obligations.

17 Reduction to 75% of total biodegradable waste produced in 1995 by 2010; reduction to 50% of total biodegradable waste produced in 1995 by 2013; and reduction to 35% of total biodegradable waste produced in 1995 by 2016. c.f. EPA National Waste Report for year 2006.

18 A facility that was operational in July 2001. c.f. Article 14 of the Landfill Directive.

19 Subject to the qualifications in Article 6(a) of the Landfill Directive.

Based on current statistics²⁰ and waste trends it is expected that for waste report years 2010, 2013 and 2016, the tonnage of BMW accepted at landfill nationally must be less than 25%, 15% and 9% (respectively) of the municipal solid waste generated in those report years. This will translate to a maximum allowable BMW content in MSW accepted at landfill of 40% (by weight) for 2010; 24% (by weight) for 2013; and, 15% (by weight) for 2016 and subsequent years (i.e. an approximate 5% per annum decrease in the BMW permitted to landfill). These limits are set having regard to both the cited EU diversion obligations, and the BAT obligation to reduce the overall environmental impact of landfill. The limits will be subject to periodic review as demanded by annual waste statistical returns, however significant fluctuations in the limits presented are not expected.

WtE Incineration

Under the principles established in BAT as well as in EU legislation and policy obligations, an operator of a waste-to-energy incinerator (WtE incinerator) must demonstrate to the EPA that what is accepted for combustion has been appropriately pre-treated.

The minimum pre-treatment obligations for waste intended to be accepted at WtE incineration facilities are articulated as follows (refer Figure 8 also):

- In the case of WtE incineration, **source separation (2 bin or equivalent) is a minimum pre-treatment/diversion requirement. For urban areas (>1,500 population) diversion or separate collection of biowaste (i.e. 3rd bin) is expected.** Mechanical treatment of the incinerator residues that will yield marketable recyclable (non-energy) fractions (e.g. metals) is also expected. Pre-incineration biological treatment of black bin residual waste is not mandatory.

²⁰ In 2007 there was 3,397,683t MSW generated. 2,014,797t of this was landfilled, of which 1,475,077t (73%) was BMW. See EPA National Waste Report for 2007 (EPA 2009).

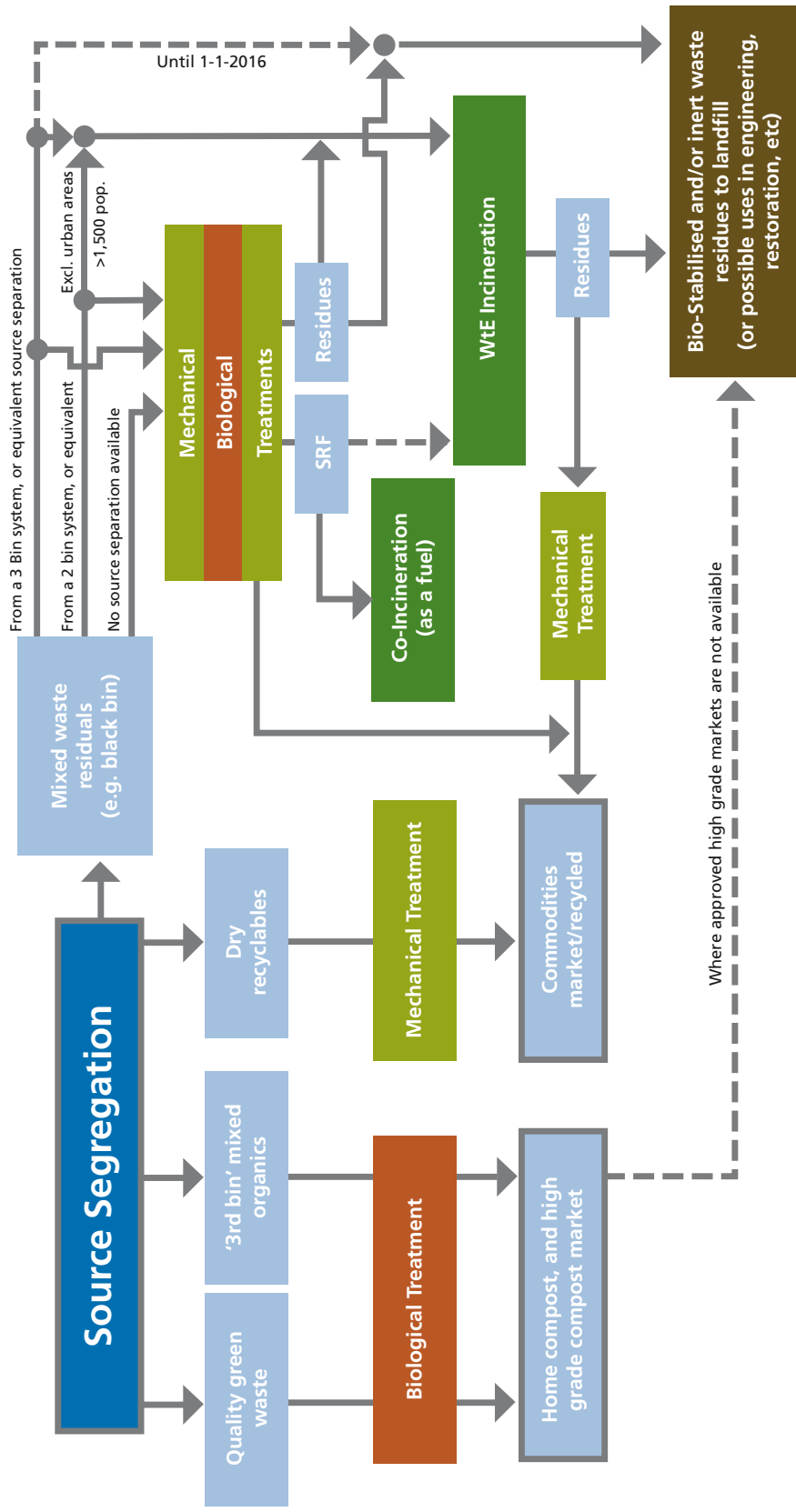


Figure 7: Waste pre-treatment/diversion flow path

Principal Disposal Route	Minimum Pre-Treatment expected	Material Diversion	Date
Landfill	1a. Separated at source. Diversion of BMW from landfill disposal stream (e.g. home composting, 2nd & 3rd bin, Civic Amenity sites, etc.,) <i>(see Note 1)</i> and, 1b. Treatment of the biodegradable element of 'black bin' pre-landfilling <i>(See Note 2)</i>	<ul style="list-style-type: none"> ■ Biodegradables 	2010, 2013 & 2016 for all landfills accepting MSW to the extent necessary to achieve the diversion obligations ^{Note 3} . Viz, <ul style="list-style-type: none"> - For report years 2010, 2011 & 2012, a maximum of 40% by weight of MSW accepted at the landfill facility for disposal shall comprise BMW - For report years 2013, 2014 & 2015, a maximum of 24% by weight of MSW accepted at the landfill facility for disposal shall comprise BMW - For report year 2016, and subsequent years, a maximum of 15% by weight of MSW accepted at the landfill facility for disposal shall comprise BMW
	2. Separate collection (segregated or mixed recyclables, excluding BMW)	<ul style="list-style-type: none"> ■ Other recyclables (glass, metals, plastics) 	16-7-09 for a landfill existing on 16-7-2001 16-7-2001 for all other landfills (including major extensions)
	3. Mechanical treatment of black bin (excluding BMW)	<ul style="list-style-type: none"> ■ Metals ■ SRF^{Note 4} ■ Other 	By 1-1-2016
WtE MSW Incinerator	4. Source separated collection system	<ul style="list-style-type: none"> ■ Biodegradables ■ Other marketable recyclables 	Prior to commencement of any MSW incinerator
	5. Mechanical treatment of post-combustion bottom ashes	<ul style="list-style-type: none"> ■ Metals ■ Other marketable recyclables 	

Figure 8: Generic – Facility Type Municipal Solid Waste Pre-treatment Obligations

Note 1: Where a 3 bin system is not available Treatment 1b will apply to the extent necessary to achieve an equivalent reduction in BMW.

Note 2: For the first two biodegradable waste diversion obligations (2010 & 2013), a national 3 bin system (including for catering/commercial sources of biowastes) will likely ensure, on its own, that the EU Landfill Directive diversion/treatment obligations are met through diversion from landfill of the biodegradable dry recyclables and the organics.

Note 3: This will translate (approximately) to the tonnage of BMW accepted at landfills in 2010 being less than 25% of the tonnage MSW generated nationally; falling to < 15% in 2013, and < 9% in 2016.

Note 4: SRF – Solid Recovered Fuel of defined specification for use as a fuel in co-incineration plants, or other energy uses as may be approved, where available.

VALIDATION OF PRE-TREATMENT

In the case of a landfill or a WtE incinerator operator, evidence will be required by the EPA regarding the successful application of an *appropriate* level of pre-treatment of the waste accepted to such facilities.

As the waste infrastructure in a region develops over time or new standards are required due to evolving national or EU waste treatment obligations, it will be necessary for landfill and incinerator facility operators to periodically revisit the rationale put forward by them in relation to confirming to the Agency that adequate and appropriate pre-treatment effort has been applied to a standard acceptable to the EPA. In any case, the Annual Environmental Report for each facility licensed by the EPA will have to present sufficient detail on waste acceptance and audit policy to satisfy the EPA that only pre-treated waste has been accepted at the facility. In developing this guidance the EPA has taken full account of the EU waste hierarchy.

The EPA will develop an updated waste characterisation protocol²¹ which will assist determination of the success or otherwise of waste diversion efforts when applied to the character of waste accepted at a landfill.

In addition, the EPA will identify test methods to assist operators in demonstrating the effectiveness of any treatment applied to residual BMW in respect of the biodegradable component (where destined for landfill disposal). Such methods will likely be based on waste process stream characterisation studies as well as activity analysis such as respirometry, or the equivalent. Different standards will be developed for compost to be used in horticultural/landscape applications, as well as for bio-stabilised residual wastes intended to be placed in a landfill. Such protocols will be notified to holders of EPA waste licences as they are developed.

In the case of bio-stabilised residual wastes, the following standard will be applied by the EPA (unless otherwise agreed in writing):

'stabilisation' means the reduction of the decomposition properties of biowaste to such an extent that offensive odours are minimised and that the Respiration Activity after four days (AT_4) is <10 mg O₂/g DM (until 1-1-2016), and <7 mg O₂/g DM thereafter.

The higher standard required from 2016 onwards reflects the desire to reduce the residual landfill gas production potential in the bio-stabilised waste sent to landfill. The higher standard is appropriate under the terms of BAT.

It is important to note that the Department of Agriculture, Fisheries & Food may require additional standards to be met to address any obligations arising out of the Animal By-Product Regulations (EU 1774/2002).

21 To be derived from Municipal Waste Characterisation Surveys 2004, 2005 & 2008.

CONCLUDING COMMENTS

Ireland will not meet its National Strategy on Biodegradable Waste and EU obligations in relation to pre-treatment of municipal solid waste prior to landfilling or incineration if action is not taken to provide the waste source-separation and treatment infrastructure necessary. Accordingly, any new landfill or incinerator proposal will have to be planned in the context of the availability of appropriate waste pre-treatment facilities (including diversion infrastructure). Such a situation would represent BAT. The requirement for an integrated approach to waste management and the provision of essential waste management infrastructure has been well flagged in published government waste policy since 1998, in EPA National Waste reports for successive years, and in particular, in the National Strategy on Biodegradable Waste.

Local and Regional Waste Authorities have the ability, through their Waste Plans and the Collection Permit system, to establish frameworks and measures that will assist in identifying and delivering the appropriate pre-treatment infrastructure and practices.

This technical guidance document establishes the EPA's minimum acceptable standards of pre-treatment of municipal solid waste prior to landfilling and incineration at EPA licensed facilities. These standards will be expressed in the form of – and enforced via – waste acceptance criteria specified in the EPA licences for such facilities. It is expected that these standards will assist Ireland in meeting its obligations as defined in EU and national waste management legislation and policy. The establishment of waste acceptance criteria and a stability standard (for bio-stabilised residual wastes) in this document addresses key recommendations of the EPA STRIVE Report on MBT processes.^{15, 22}

Supporting guidance on waste characterisation for different residuals from waste treatment processes as well as identification of sampling and test methods will assist delivery of the objectives of this guidance.

In addition it will be essential that commercial and catering sources of biowastes implement source separation practices with diversion to treatment: such a requirement will be essential to achievement of the landfill diversion targets. The making of new regulations for tiered landfill levies will also be important in incentivising pre-treatment/diversion options.

This pre-treatment document, including the statistical basis for the diversion obligations, will be subject to periodic review as required. Separate guidance may be issued in relation to the pre-treatment of waste streams not included in the general scope of Municipal Solid Waste (e.g. municipal and industrial organic sludges).

22 'Critical Analysis of the Potential of Mechanical Biological Treatment for Irish Waste Management' (2005-WRM-MS-35) Synthesis Report. EPA STRIVE Programme 2007–2013. EPA 2008.

ANNEX 1

Glossary/Acronyms

2 Bin, 3 Bin System & Black Bin means a source segregated collection system where dry recyclables and residual wastes are separately collected (2 bin), or where dry recyclables, organics and residuals are separately collected (3 bin). The reference to 'black bin' in this document is a reference to the residuals bin from a 2 or 3 bin system.

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

Biodegradable Municipal Waste (BMW) means the biodegradable component of municipal waste, and does not include bio-stabilised waste. Biodegradable municipal waste is typically composed of food and garden waste, wood, paper, cardboard and textiles. Approximately 73% of the household and commercial waste managed in Ireland in 2007 was biodegradable.

Biological Treatment means composting, anaerobic digestion, mechanical-biological treatment or any other biological treatment process for stabilising and sanitising biodegradable waste, including pre-treatment processes.

Bio-stabilised Residual Waste means residual BMW that has been treated to achieve an EPA approved biodegradability stability standard (*c.f.* page 19 of this document) prior to landfilling or alternative use agreed. (Not a compost product standard as understood by EU 1774/2002.)

Biowaste means household, commercial or industrial waste of an organic or putrescible character.

Co-incineration means any stationary or mobile plant whose main purpose is the generation of energy or production of material products and:

- which uses wastes as a regular or additional fuel; or
- in which waste is thermally treated for the purpose of disposal.

If co-incineration takes place in such a way that the main purpose of the plant is not the generation of energy or production of material products but rather the thermal treatment of waste, the plant shall be regarded as a [merchant] incineration plant (*c.f.* Article 3 of 2000/76/EC).

Mechanical-Biological Treatment (MBT) means the treatment of residual municipal waste through a combination of manual & mechanical processing and biological stabilisation, in order to stabilise and reduce the volume of waste which requires disposal.

Municipal Solid Waste (MSW) means household waste as well as commercial and other waste which, because of its nature or composition, is similar to household waste. It excludes municipal sludges and effluents.

NSBW National Strategy on Biodegradable Waste (DoEHLG, 2006).

OFBMW Organic Fraction of Biodegradable Municipal Waste.

Residual Waste means the fraction of collected waste remaining after a treatment or diversion step, which generally requires further treatment or disposal.

SRF Solid recovered fuel (to a specification).

Treatment/pre-treatment includes, in relation to waste, any manual, thermal, physical, chemical or biological processes that change the characteristics of waste in order to reduce its volume or hazardous nature or facilitate its handling, disposal or recovery.

WFD EU Waste Framework Directive (2006/12/EC, unless otherwise stated).

An Gníomhaireacht um Chaomhnú Comhshaoil

Is í an Gníomhaireacht um Chaomhnú Comhshaoil (EPA) comhlachta reachtúil a chosnaíonn an comhshaoil do mhuintir na tíre go léir. Rialáimid agus déanaimid maoirsiú ar ghníomhaíochtaí a d'fhéadfadh truailliú a chruthú murach sin. Cinntimid 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 comhshaoil na hÉireann a chosaint agus cinntiú go bhfuil forbairt inbhuanaithe.

Is comhlacht poiblí neamhspleách í an Gníomhaireacht 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 agus Rialtais Áitiúil a dhéanann urraíocht uirthi.

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 comhshaoil 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 peitreal.

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 húdarais áitiúla agus leis na Gardaí chun stop a chur le gníomhaíocht mhídhleathach dramhaíola trí chomhordú 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 chomhshaoil mar thoradh ar a gníomhaíochtaí.

MONATÓIREACHT, ANAILÍS AGUS TUAIRISCIÚ AR AN gCOMHSHAOIL

- Monatóireacht ar chaighdeán aer agus caighdeán 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 shaincheistanna comhshaoil a chomhordú (cosúil le caighdeán aer agus uisce, athrú aeráide, bithéagsúlacht, teicneolaíochtaí comhshaoil).

MEASÚNÚ STRAITÉISEACH COMHSHAOIL

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

PLEANÁIL, OIDEACHAS AGUS TREOIR CHOMHSHAOIL

- Treoir a thabhairt don phobal agus do thionscal ar cheistanna comhshaoil éagsúla (m.sh., iarratais ar cheadúnais, seachaint dramhaíola agus rialacháin chomhshaoil).
- Eolas níos fearr ar an gcomhshaoil 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 Gníomhaireacht i 1993 chun comhshaoil na hÉireann a chosaint. Tá an eagraíocht á bhainistiú ag Bord Iáinimseartha, ar a bhfuil Príomhstíúrthóir agus ceithre Stíúrthóir.

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 cheistanna ar ábhar inniúil agus le comhairle a thabhairt don Bhord.



ENVIRONMENTAL PROTECTION AGENCY

An Ghníomhaireacht um Chaomhnú Comhsaoil
PO Box 3000, Johnstown Castle Estate, Co. Wexford, Ireland
Telephone: +353 53 916 0600 Fax: +353 53 916 0699
Email: info@epa.ie Website: www.epa.ie
LoCall 1890 33 55 99