



Hitting the Targets for Biodegradable Municipal Waste:

Ten Options for Change



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DISCUSSION PAPER

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Strategic Policy Research Unit - Discussion Papers

The Strategic Policy Research Unit's Discussion Papers are intended to stimulate discussion on issues with important environmental dimensions. The papers review the main issues and propose a number of ideas for consideration by stakeholders and policy-makers with the objective of collectively achieving a better and more effective environmental outcome. The current paper is intended to contribute to a stakeholder discussion in an area where policy issues are currently under review and not fully formulated. The opinions expressed in the paper are those of the author, are not setting environmental policy and should not be relied upon as policy statements or the opinion of the Environmental Protection Agency in planning or other regulatory matters with respect to the environment. This paper is one in a series of discussion papers, which also includes

- Bio-energy - Opportunities for Agriculture, Industry, and Waste Management, August 2006
- Anaerobic Digestion: Benefits for Waste Management, Agriculture, Energy, and the Environment, January 2005

HITTING THE TARGETS FOR BIODEGRADABLE MUNICIPAL WASTE: Ten Options for Change

Abstract

Delivery of the Landfill Directive and National Biodegradable Waste Strategy targets for the organic fraction of biodegradable municipal waste (OFBMW) is behind schedule. To comply with the Landfill Directive's 2016 target means that the country must develop additional capacity to manage upwards of 1 million tonnes of OFBMW. This paper reviews the way we manage our OFBMW and suggests ten possible public policy interventions to encourage changes in management practices.

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
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

Hitting the targets for Biodegradable Municipal Waste: Ten Options for Change

The EU Landfill Directive (1999/31/EC) and the National Biodegradable Waste Strategy set out bold targets for the diversion of Biodegradable Municipal Waste (BMW) from landfill. This paper examines the challenges faced in diverting the organic fraction of biodegradable municipal waste from landfill disposal and finding alternative recovery outlets. The organic fraction of biodegradable municipal waste (OFBMW) principally comprises food and garden waste from the household and commercial sectors.

Based on the National Waste Report 2006 total diversion of OFBMW from landfill disposal was 64,725 tonnes in 2006. The target for 2010 is 647,033 tonnes rising to 941,891 tonnes by 2016. These targets include both biological and residual treatments for OFBMW, as indicated in Table 1.

Table 1: Treatment targets for the organic biodegradable municipal waste

Year	Managed Organic BMW	Biological treatment targets (tonnes)	Residual treatment targets	Total treatment
2004	746,532			49,578*
2005	744,685			47,802
2006	819,919			64,725
2010	966,003	338,129	308,904	647,033
2013	964,060	414,546	438,190	852,736
2016	921,104	442,129	499,762	941,891

Source: National Waste Report 2005¹ – Table 16, National Waste Report 2006² – Table 14, National Biodegradable Waste Strategy³ – Table 8.3

*This figure was revised from 83,505 to 49,578 in the 2005 National Waste Report

Based on the most recent waste management statistics target delivery appears to be behind schedule. To comply with the Landfill Directive's 2016 target means that the country must develop new systems and infrastructure to manage in excess of 1 million tonnes of BMW (incl. organics), or roughly additional capacity of 110,000 tonnes every year for the next decade. As the greater share of BMW is organic waste, a substantial proportion of the additional capacity will be earmarked for OFBMW management.

1 Odile Le Bolloch, Brian Meaney, Jennifer Cope and Martin Doyle, "National Waste Report 2005: Data Update", Environmental Protection Agency, 2006

2 Odile Le Bolloch, Jennifer Cope, Brian Meaney, and Isabelle Kurz, "National Waste Report 2006", Environmental Protection Agency, 2007

3 "National Strategy on Biodegradable Waste" Department of Environment, Heritage and Local Government, 2006

This paper reviews the way we manage our OFBMW and suggests possible public policy interventions to encourage changes in management practices. The intention is to broaden the public discussion to include wider market issues, rather than focus solely on narrower topics such as specific technologies. A number of questions are posed:

- Should organic waste be managed centrally or at source?
- What are the central management options?
- Will there be sufficient (market) outlets for the treated materials/products?

1. Should organic waste be managed centrally or at source?

Treatment at source of OFBMW involves either home composting or use of on-site composting systems by commercial establishments. At source composting is not a practical option for all households and businesses but where it is feasible it avoids the requirement for waste collection, treatment, product marketing/distribution and or disposal. The cost of at-source treatment can be significantly less than centralised management systems and is likely to entail more efficient use of resources.

The biodegradable waste strategy envisages some 92,000 tonnes per annum of OFBMW to be home composted by 2016. Local authorities already encourage home composting and in many cases have subsidised home composting bins. However, achieving this target or preferably exceeding it will require some innovative measures. The decision to compost, whether by a business or a household, is not simply a matter of cost. The decision will often be due to more practical issues such as what can be composted, what to do, and how to trouble shoot problems. An easily accessible resource to address the practical obstacles to composting is necessary if at-source composting is to expand substantially. For households such a resource might include provision of local composting workshops, on-going composting demonstration centres, or availability of dedicated staff to advise/visit households. While providing such a service would entail additional expenditure, the cost would be relatively small compared to the capital and operating costs of providing ongoing centralised treatment systems.

A major shortcoming of existing home composting systems is their inability to treat meat wastes. Consideration should be given to prioritising research projects to develop composting systems that can treat meat wastes without odour and vermin problems. Such research would be of considerable benefit and interest to households and would also increase the level of diversion of OFBMW by households.

Home composting also offers a significant advantage over centralised treatment systems in that the animal by-products regulations,⁴ which are animal disease control measures, impose conditions on commercial waste contractors in the recovery of waste products comprised of animal by-products. The regulations do not apply to home composting where the compost can be used without restriction in the garden.

⁴ S.I. No. 612 of 2006 European Communities (Transmissible spongiform encephalopathies and animal by-products) regulations 2006; S.I. No. 707 of 2005 European Communities (Animal By-products) (Amendment) Regulations 2005; S.I. No. 248 of 2003 European Communities (Animal By-products) Regulations 2003

Conclusion – Composting at source possibly represents the lowest cost and most environmentally sustainable option for treating OFBMW where it is practically feasible. Much greater effort should be employed in increasing both the types of wastes that can be composted at source and the number of businesses and households that compost on site versus employing high-cost high-tech alternatives

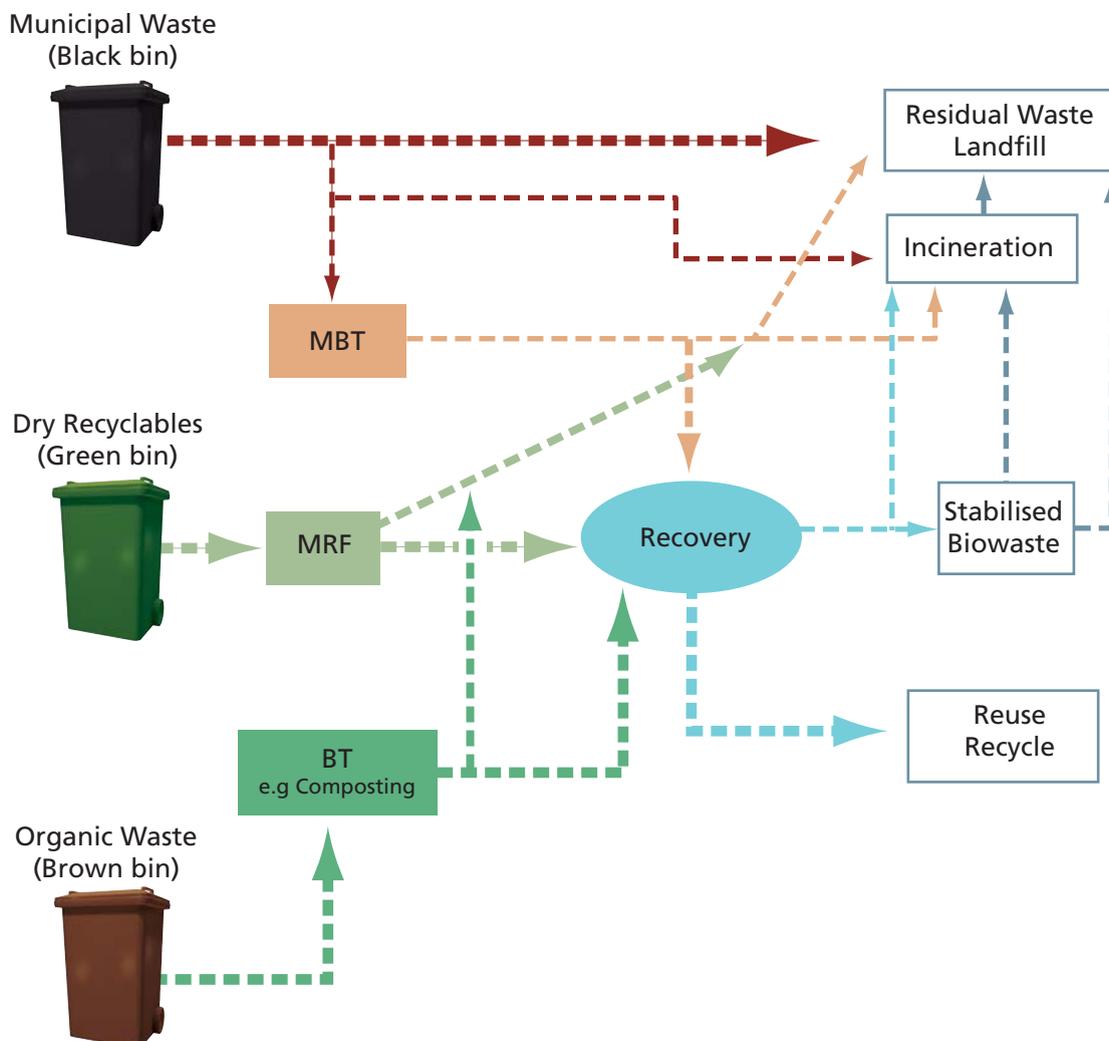
2. Options for centrally managing municipal waste

Options for centrally managing OFBMW are entwined with the management of the wider municipal waste stream. The management of municipal waste is complex and Figure 1 illustrates the potential variety of collection and treatment options available. Specific treatment options are not evaluated or ranked in this paper but rather the implications for achieving the biodegradable waste targets are highlighted for each option. Although incineration of municipal waste is not currently available it is included as a potential option in this analysis.

Municipal waste is generally collected in one- two- or three- bin systems. Traditionally the most common collection option was a one-bin system for municipal waste. The management options for municipal waste from one-bin collection are landfill, mechanical biological treatment (MBT),⁵ or incineration. Historically direct disposal to landfill was the predominant option but is no longer a preferred option in light of the Landfill Directive targets. MBT is increasingly being used as a preliminary treatment option for municipal waste. MBT treatment of municipal waste affords the opportunity to recover materials (e.g. wood, metals), however, due to soiling and contamination within a one-bin system there are few reuse/recycle opportunities. MBT produces stabilised biowaste, the majority of which must be subsequently managed either via landfill or incineration.

5 Mechanical Biological Treatment (MBT) is used as the umbrella term for all types of mechanical biological treatment concepts. MBT involves mechanical sorting and separation of the waste into an organic biodegradable stream, which is sent to a biological process yielding stabilised biowaste, and into other separate waste streams, some of which may be suitable for recycling.

Figure 1: Treatment options in one- two- and three- bin collection systems



The two-bin system is the most common approach today for collection of municipal waste. The second (green) bin for dry recyclables affords greater opportunities for recovery. Dry recyclables are usually processed in a Material Recovery Facility (MRF) where cardboards, plastics, etc., are separated for subsequent processing. With significantly less soiling/contamination compared to a one-bin system more materials can potentially be reused/recycled (e.g. cardboard). Residual wastes from MRFs may be sent either for landfill disposal or incineration, whereas some of the collected waste streams, especially high calorific wastes, may be sent for energy recovery via incineration.

Neither one-bin nor two-bin collection facilitates the recovery of the inherent economic value of OFBMW. Nutrients from OFBMW when suitably processed can be substituted for products such as peat compost or chemical fertiliser whereas recovered energy in the form of gas can displace fossil fuels and reduce (net) greenhouse gas emissions. A three-bin collection system incorporating a (brown) bin for OFBMW facilitates biological treatment (BT), such as composting or anaerobic digestion. Biological treatment of a contaminant free homogenous waste stream yields outputs suitable for a variety of reuse/recycle purposes (e.g. landspreading, compost, etc.). However, if OFBMW is subject to contamination reuse/recycle opportunities may be limited and the material treated as commingled municipal waste.

The complexity of municipal waste management is illustrated in Figure 1 and yet is not fully representative of the myriad of treatment technologies and combinations utilised. What is clear is that source separation affords the best opportunity to completely remove OFBMW from landfill. What is clear also is the significant role that MBT can play in one- and two- bin collection schemes. However, due to lack of widespread approval for safe alternative uses for stabilised biowaste it raises a number of questions. Does landfill of MBT treated stabilised biowaste constitute value for money and is it environmentally sustainable? If most of the outputs of MBT are incinerated (e.g. stabilised biowaste and refuse derived fuel) is the preliminary treatment by MBT superfluous and does it add unnecessary costs to the price of waste services?

There are a range of collection and treatment options for OFBMW, the choice of which will be subject to local circumstances, but the different options do not yield equivalent outcomes. Greater levels of source separation afford greater opportunities to reuse or recycle specific waste streams; however, Section 4 considers whether there is capacity to reuse/recycle all the potential treated wastes from this source. MBT is being advocated in the market as an economical way to manage the residual waste stream, including OFBMW. However, the question of where the outputs of MBT are to be subsequently treated, especially if the use of MBT is to be significantly expanded, has not been adequately assessed. Is landfill of MBT treated wastes the best option from financial and sustainability perspectives? If the MBT treated outputs are incinerated in the future what level of pre-treatment is economically viable?

Conclusion – Municipal waste management involves a complex combination of treatment possibilities, however, they do not yield equivalent outcomes.

- A greater level of source separation affords greater opportunities to reuse or recycle specific waste streams and therefore may be preferable where economically feasible.
- MBT plays an important role in waste management, especially in the context of the Landfill Directive limits on the amount of untreated OFBMW that can be landfilled. However, with the anticipated growth in OFBMW greater analysis is necessary on the use of the recovered elements of MBT in order to determine the most cost and environmentally efficient methods to achieve the targets set for diversion of biodegradable municipal waste.

3. Challenges for OFBMW management

There are many technical and environmental challenges to be overcome in delivering the targets for OFBMW management, for example, agreeing a national standard for compost products. There are also a series of economic or market challenges facing the sector, including:

- Building a commercially viable collection system for segregated OFBMW.
- Developing sufficient commercially viable infrastructural capacity to process OFBMW using technologies that deliver superior environmental outcomes.

These challenges are reviewed in turn and potential policy measures to support development of the sector are suggested.

3.1 Building a commercially viable collection system for OFBMW

Source segregated OFBMW collection is already available in a number of areas where the local authority is still involved in the collection of municipal waste. However, widespread roll out of source segregated OFBMW collection (e.g. brown bins) is not guaranteed and has been very poor to-date amongst private waste collectors. Under current market conditions collection schemes that incorporate separated OFBMW are likely to be more expensive than other services.⁶ Due to the relatively high level of price competition between waste collection contractors and also the price sensitivity of customers it is unlikely that (private) waste contractors will unilaterally offer more expensive services incorporating source segregated OFBMW collection.

For source segregated OFBMW collection to be successful, which means significant diversion of OFBMW and addressing customers concerns about odours and collection frequency, it will be necessary to make source segregated OFBMW collection economically viable for waste collectors. Where source segregated OFBMW collection is not commercially viable consideration should be given to subsidising such schemes, at least on an interim basis. A subsidy should be based on the tonnage of treated (diverted) OFBMW and would provide a continuing incentive to waste collectors to increase the level of diversion by its customers.

An increase in the landfill levy could also be considered as a means to encourage people to divert waste from landfill disposal. A landfill levy increase would improve the financial viability of alternative OFBMW treatment options (e.g. composting) compared to landfill. The landfill levy, at €15/tonne, is considerably lower than similar levies elsewhere in Europe, for example England €35/t (stg£24/t), Sweden €40/t, Denmark 50/t, Flanders €55/t and the Netherlands €65/t. An increased landfill levy creates an incentive to divert all waste, not just OFBMW, though revenue from the increased levy could fund initiatives targeting OFBMW diversion. An additional landfill levy on the organic fraction of BMW would create a specific incentive to divert OFBMW.

⁶ Many areas are currently serviced by a 2-bin collection system or similar variants, comprising a green bin for dry recyclables and black bin for residual waste. Source segregate OFBMW collection is normally incorporated into a 3-bin system, green for dry recyclables, brown for OFBMW, and black for residual wastes. The cost of additional collection bins, haulage and special treatment bin normally make 3-bin systems more expensive than existing 2-bin collections systems.

In England the incentive to divert biodegradable municipal waste from landfill rests with landfill operators via the Landfill Allowance Trading Scheme (LATS), which imposes a quota on the amount of OFBMW that can be landfilled. Quotas are tradable, similar to the EU's Emissions Trading Scheme, giving flexibility to individual landfills while achieving national targets. The incentives created by the quotas and penalties within LATS have led to a reduction in biodegradable municipal waste landfilled; in 2005/06 BMW landfilled was 18.5% less than allowances allocated under LATS.⁷ Norway has taken a less complex approach and is proposing a partial ban on landfilling biodegradable waste with a limit of 10% on the biodegradable content of landfilled waste. Germany has completely banned the landfilling of untreated biodegradable matter and organic municipal solid waste since June 2005. Consideration should be given to imposing a national ban on the landfill of untreated municipal waste. Such a ban would drive a major reduction in the landfill of biodegradable waste. A range of treatment options is available including those that occur at collection and subsequently.

Regulation could also be used to manage OFBMW collection and treatment. For example, regulations for the mandatory roll out of source separated OFBMW collection or measures to ban landfill of OFBMW similar to the Norwegian and German policies. The Competition Authority has already raised the point that the market for household waste collection is not working well for consumers, therefore, any new initiatives should be fully assessed to avoid further deterioration of service.⁸

Prior to making significant investment in segregated OFBMW collection consideration needs to be given to (i) whether it should be rolled out in all areas, as it may be better value for money to provide other services such as provision of basic collection service to households without any service, and (ii) whether there will be sufficient outlets for products derived from this waste stream. This issue is addressed in Section 4.

Conclusion – Source separated OFBMW collection (e.g. in dedicated brown bins) is necessary for good recycle/use options but (i) it may not be the best use of resources to universally introduce 3-bin collection and (ii) it is not currently clear whether there will be sufficient reuse/recycle outlets for the treated OFBMW collected in the third (brown) bin

For Consideration –

- Where source segregated OFBMW collection is advocated a subsidy payable on the tonnage of treated waste may be necessary to successfully roll out collection service at reasonable cost to consumers.
- Increasing the landfill levy or introducing an additional landfill levy specifically for the organic fraction of BMW would encourage diversion of waste from landfill.
- A ban on landfilling untreated municipal waste would drive a major a reduction in biodegradable waste destined for landfill.

7 "Report on the Landfill Allowances and Trading Scheme (LATS) 2005/6", November 2006, Environment Agency.

8 Decision of The Competition Authority (Case COM/108/02) "Alleged excessive pricing by Greenstar Recycling Holdings Limited in the provision of household

3.2 Developing infrastructural capacity

Private operators and local authorities are likely to continue to develop infrastructure to manage OFBMW. With a free and competitive market, infrastructure will be developed where it is financially viable, as is currently the case, but the full infrastructural deficit will not necessarily be filled. Waste contractors face considerable uncertainty in developing much needed infrastructure because there is no integrated national plan that outlines detailed waste infrastructural requirements, which in turn informs regional waste management plans. The National Biodegradable Waste Strategy does not provide the level of detail necessary for such a national waste management plan - an integrated plan should outline not only the targets but also where, by whom and how these targets should be achieved, as well as a programme of measures to achieve the targets. In addition overall responsibility for driving the plan must be assigned. A national plan would overcome the deficits inherent in regional waste management plans and provide clear guidance to planning officials and waste regulatory authorities. It would also provide clarity to investors on whether their infrastructure projects are compliant with national waste and planning policies. Forfas⁹ has also recently called for coordination among regional waste management plans and an increased urgency in the implementation of waste management plans, work that was initially earmarked for the National Waste Management Board in the waste policy document *Delivering Change*, published in 2002.

In predominantly rural regions or regions with relatively low waste volumes the cost of service provision is likely to be proportionately higher.¹⁰ In such situations the regional waste management plan boundaries are potentially artificial barriers to cost effective waste management. Larger scale plants can often realise economies of scale and thus reduce unit costs. The exclusion from consideration of projects involving larger scale facilities sourcing waste from across county and regional boundaries, consistent with the proximity principal for waste management and national waste policy and the EU's High Level Group On Competitiveness, Energy And The Environment,¹¹ should be avoided.

To help redress the waste infrastructure deficits, consideration should be given to extending financial incentives towards the capital cost of critical waste infrastructure. The Business Expansion Scheme (BES) already supports investment in recycling activities in relation to waste material. Further financial incentives may also be necessary to encourage investment in other aspects of waste management.

9 "Waste Management in Ireland: Benchmarking Analysis and Policy Requirements" (March 2007).

10 The economics may be more difficult because smaller capacity infrastructure may not be able to realise economies of scale, and transport costs may be prohibitive in extending catchments.

11 Fifth Report Of The High Level Group On Competitiveness, Energy And The Environment: Contributing to an integrated approach to competitiveness, energy and environment policies, November 2007. http://ec.europa.eu/enterprise/environment/hlg/doc_07/hlg-fifth-08-11-07.pdf

Conclusion –

- The absence of an integrated national waste management plan creates uncertainty for investors developing new infrastructure while regional waste management plan boundaries are potentially artificial obstacles to cost effective waste management.

For Consideration –

- A detailed national waste management plan should be developed with responsibility for delivery clearly designated.
- Remove unnecessary restrictions on waste management proposals that curtail waste movements across county or regional boundaries, as these restrictions may add to the cost of waste management.
- A scheme similar to the Business Expansion Scheme (BES) might be considered as a means to raise funding to close the waste infrastructure deficit.

3.2.1 Site Selection

The diversion of some 900,000 tonnes of OFBMW from landfill disposal requires substantial investment in new waste facilities for waste handling and treatment. Site selection for this new infrastructure is critically important because site location affects the level of waste management costs, which in turn has significant implications on whether the National Biodegradable Waste Strategy targets will be achieved. Planning and regulatory bodies involved in waste management need to consider the wider implications of their decisions, especially with respect to the following issues:

- Individual waste management sites should be viewed as elements of the national waste management infrastructure. Therefore, proposals for new infrastructure should be evaluated in light of their contribution to the national waste infrastructure deficit not just within the context of regional waste management plans. As the regional waste management plan areas, and the State in general, are relatively small in size, many locations are in close proximity to multiple waste management planning areas therefore it does not make sense on environmental or economic grounds to develop new infrastructure in isolation.
- Many of the parameters used in landfill site selection are also relevant for selecting sites for OFBMW facilities. Key characteristics of landfill site selection in recent years include good accessibility at sites that are relatively remote from population centres.
- OFBMW treatment facilities produce relatively low valued products though compete with high value added manufacturers for zoned land to develop their facilities. If the development of OFBMW treatment infrastructure is restricted to highly valued industrially zoned land there will be a direct effect on the unit cost of OFBMW treatment.

- OFBMW management facilities with energy recovery capacity require connections to the distribution networks for electricity and gas. Without entailing prohibitive costs suitable locations for such facilities are limited to sites in close proximity to the energy transmission networks.¹²

A national waste management plan should clarify waste policy with regard to these issues.

For Consideration – National guidance on waste infrastructure site selection is required, possibly as part of a National Waste Management Plan. Such guidance would help ensure uniform rules across planning authorities and also ensure the wider implications for waste management are not over looked.

3.2.2 Material Recovery Facilities/ Mechanical Biological Treatment

Mechanical Biological Treatment (MBT) is used to treat commingled waste and may be particularly important in areas where source segregated collection is not economic, e.g. some rural areas. Material Recovery Facilities (MRFs) through a range of techniques (hand picking, screens, blowers, magnets, etc) separate commingled wastes after which OFBMW can be sent for biological treatment (e.g. composting). There is a range of outputs from the processes typically employed in MBT facilities:

- Stabilised biowaste fraction – that is the result of a biological treatment phase (typically composting) where the degradability of the material is greatly reduced.
- Solid Recovered Fuel (SRF) product – refers to a high calorific value material recovered during the mechanical sorting phase within the MBT process. This material is also described as Refuse Derived Fuel (RDF). There is no formal definition of the exact constituents of SRF/RDF.
- Ferrous and non-ferrous metallic outputs.
- Biogas production – when anaerobic digestion is used for the biological treatment phase.

¹² For details on the cost of electricity grid connections see “Standard Pricing Approach for Connecting Renewable Generators to the Distribution Network”, CER/05/090, Commission for Energy Regulation, 2005

This paper is only concerned with the stabilised biowaste outputs from MBT. The use of MBT raises a number of issues for management of OFBMW:

1. Because MBT facilities utilise a range of processes and configurations and due to differences in waste feedstock, stabilised biowaste is not a homogenous output. There are no definitions or standards for what constitutes stabilised biowaste, the lack of which makes the management of stabilised biowaste difficult. The EPA is currently funding research to develop a national standard for compost. Similar research is required to develop a better understanding of the properties of stabilised biowaste and establish national standards for the material.
2. MBT processes cannot guarantee that stabilised biowaste is not contaminated with materials that pose difficulties for subsequent management. Potentially contaminated stabilised biowaste poses a risk to environmental quality, animal and human health.
3. With very limited approved uses for stabilised biowaste, the consequence of continued expansion of MBT capacity will be production of large volumes of stabilised biowaste. Potential management options for stabilised biowaste are:
 - Landfill (separate from landfill cover).
 - Incineration or co-incineration in cement kilns (materials such as solvents and meal-and-bone are already being contemplated for co-incineration).
4. One of the benefits of MBT treated OFBMW (i.e. stabilised biowaste) compared to untreated OFBMW is the reduction in volume, which diminishes the landfill capacity requirement. The MBT process also accelerates the decomposition of the waste compared to untreated OFBMW and reduces but does not eliminate its leachate and the landfill gas potential thereby reducing associated pollution risks once landfilled.

Conclusion – MBT treatment of residual waste is preferable to no treatment prior to landfill due to the benefits in gas and leachate management, as well as volume reduction. However, if MBT (in conjunction with one- and two-bin collection) is to be the predominant treatment option for OFBMW then (in the absence of incineration) the majority of OFBMW will be landfilled.

3.2.3 Biological Treatment

There is a range of biological treatment technologies available for processing OFBMW and generally most can be classified as either utilising composting or anaerobic digestion methods.

Composting is increasingly being used to manage OFBMW and because quality compost has a variety of potential uses it is considered an environmentally sustainable treatment option. Even so compost facilities experience a number of operational challenges:

- Similar to all waste infrastructure, compost facilities are dependent on revenue from a continuous waste feedstock supply and as such compete with other waste facilities, such as landfill or MBT. The gate fee for waste feedstock varies on the level of competition but current evidence¹³ suggests that landfill operators are undercutting compost facilities. Consequently, the current market incentive is to discourage rather than encourage diversion of organic waste away from landfill.
- Based on market prices for compost, compost facilities generally operate on the basis that compost produced has zero or very limited market value. The ability of compost facilities to be price competitive in the future compared to other management options will be dependent on establishing a revenue stream for the compost produced. The development of a strong market for compost directly impacts the viability of the sector.
- The ability of the compost sector to develop markets for its output is dependent on producing high quality products. The EPA is currently funding research to assist in the development of certified compost standards whereas the Market Development Group have earmarked funding to develop a compost quality assurance scheme. In general the production of high quality compost is critically dependent on using uncontaminated OFBMW feedstock, which can normally only be sourced from source separated waste collection.

Anaerobic digestion is not being used in Ireland for the treatment of the organic fraction of municipal solid waste but despite initial technical difficulties it is now established as a viable treatment technology in Europe with more than 120 full-scale plants with digestion capacity of almost 4 million tonnes per year.¹⁴ Compared to other technologies used to treat OFBMW, anaerobic digestion can additionally recover renewable energy and treat organic wastes generally considered unsuitable for composting (e.g. sludge, abattoir wastes).¹⁵

As the treatment of sludge and animal by-products is becoming increasingly problematic for food processing and other industrial sectors, the potential synergies between industrial and municipal waste treatment may result in lower treatment costs for both sectors. Also energy recovered via anaerobic digestion will directly contribute to achieving national renewable energy and climate change targets.

13 Cré – Composting Association of Ireland Teo, Newsletter 15 – August 2007

14 De Baere L., "Will anaerobic digestion of solid waste survive in the future?" *Water Science and Technology* 2006;53(8):187-94. The capacity includes both municipal waste and other feedstock.

15 For further details on the environmental and other benefits associated with anaerobic digestion see "Anaerobic Digestion: Benefits for Waste Management, Agriculture, Energy, and the Environment", Environmental Protection Agency Discussion Paper, 2005

Commercial development of anaerobic digestion facilities has been slow, due in part to the fact that the environmental benefits (e.g. CO₂ emissions averted) do not yield revenue. Policy intervention to encourage development of anaerobic digestion may be required.

Conclusion –

- Composting is an environmentally sustainable treatment option for OFBMW treatment.
- Current price competition for waste feedstock means that composting facilities are being undercut and that current relative prices encourages landfill rather than diversion from landfill.
- The development of a market for compost, and the expansion of composting as a means to manage OFBMW is conditional on establishing source separated waste collection for OFBMW.
- Anaerobic digestion provides added value in OFBMW management, it can both efficiently treat sludge and recover renewable energy, unlike many other OFBMW treatment technologies.

For consideration

- Policy intervention may be necessary to ensure that biological treatment technologies, which provide more environmentally sustainable outcomes (e.g. reuse/recycle) are not at a competitive disadvantage compared to technologies further down the waste hierarchy.

3.2.4 Energy Recovery

There is a range of technologies for managing municipal waste that incorporate energy recovery. Among these are:

- Anaerobic digestion
- Incineration
- Pyrolysis /gasification

Anaerobic digestion, already discussed in the previous section, is a biological treatment process that recovers methane, which can be subsequently used as a fuel. Unlike the other energy recovery options all the outputs from the anaerobic digestion process can be reused/recycled subject to relevant regulations. The digested organic outputs can be integrated back into the land as a soil conditioner or fertiliser.

Incineration can use as a feedstock either untreated municipal waste or specific high calorific value materials often described as Solid Recovered Fuel (SRF) or Refuse Derived Fuel (RDF).

Pyrolysis /gasification is a thermal treatment technology that converts waste into a fuel and also intermediate products that can be purified as feedstock for petro-chemicals and other applications. Similar to anaerobic digestion, pyrolysis/ gasification has been used to process sewage sludge and agricultural residues.

All the waste treatment technologies that incorporate energy recovery contribute to a number of national policy targets – Kyoto, renewable energy, renewable electricity, and climate change. In addition, all the energy recovery technologies have a higher priority than landfill in national and EU waste policy hierarchy and are directly compatible with the landfill directive in that they play a part in diverting biodegradable municipal waste from landfill.

Conclusion –

- Several waste management technologies incorporate energy recovery and thereby contribute to a range of environmental and energy policy targets in addition to playing a part in diverting biodegradable waste from landfill.

4. Will there be sufficient (market) outlets for all the treated materials/ products?

With some 900,000 tonnes of OFBMW treatment capacity to be developed over the coming years outlets for the recovered material must be found. Treated OFBMW will ultimately be either landfilled as treated waste, incinerated/co-incinerated or incorporated back into land.

A number of issues of concern arise relating to potential uses of stabilised biowaste and the market for compost, stabilised biowaste, and similar materials.

- At present the only approved use for stabilised biowaste is as a component of landfill cover. The contamination of stabilised biowaste with hazardous materials remains an issue of concern. Clarity is required on all the permitted uses of stabilised biowaste including the identification of all suitable sites and their potential annual demand.
- Treated sewage sludge is currently being used for the restoration of some mine tailings sites. Any decision on the use of stabilised biowaste for mine tailings restoration must consider the potential displacement of treated sewage sludge and the availability of alternative outlets.
- Existing research on the potential outlets for compost derived from biodegradable waste, which suggested outlets for 447,750 tonnes of compost per annum, may now be too optimistic.¹⁶ Animal By-products legislation¹⁷ imposes landspreading restrictions on certain materials contained within OFBMW effectively limiting land that can receive compost derived from waste. The advent of the Nitrates Directive means farmers may be reluctant to accept nutrients from off-farm sources, regulations on the nutrient availability and spreading of sludge will restrict the economic viability of landspreading, and more generally there is public opposition to landspreading of treated waste.¹⁸
- The National Biodegradable Waste Strategy suggests that the supply of OFBMW products will increase dramatically, as indicated in Table 2. By 2016 it is envisaged that up to 165,000 tonnes per annum of material suitable for horticulture and organic farming and approximately 250,000 tonnes of stabilised biowaste will be supplied onto the market. The potential market outlets for compost and other products derived from biodegradable municipal waste needs to be critically re-evaluated. Without new market research on the true extent of the potential market for these outputs it would be unwise to invest in expensive treatment technology to produce outputs for which a market might not exist.

16 Paul van der Werf, Cairiona Carter, Gene Browne, Mac Dara Hosty. "Assessment and Evaluation of Outlets of Compost Produced From Municipal Waste", EPA (2002)

17 S.I. No. 612 of 2006 European Communities (Transmissible spongiform encephalopathies and animal by-products) regulations 2006; S.I. No. 707 of 2005 European Communities (Animal By-products) (Amendment) Regulations 2005; S.I. No. 248 of 2003 European Communities (Animal By-products) Regulations 2003

18 Public opposition to sludge spreading in Galway and Wexford during 2007 are examples.

Table 2: Potential Compost and Stabilised Biowaste Supplies

Year	Home produced compost ^(a)	Centrally produced products from diverted household and commercial waste ^(b)	Stabilised Biowaste from residual treatment ^(c)	Potential market supply (excl. home compost)
2010	40,757	119,538	154,452	273,990
2013	40,671	158,166	219,095	377,261
2016	46,055	165,511	249,881	415,392

Source: All figures assume a 50% reduction in weight of treated outputs compared to waste inputs. Figures calculated from National Biodegradable Waste Strategy Targets – Table 8.4

- (a) Home composting targets (%) by total household organic waste
 (b) Biological treatment targets (%) for household waste by total household organic waste plus commercial diversion targets (%) by total commercial organic waste
 (c) Residual treatment targets

The Market Development Group, established by the Department of Environment, Heritage and Local Government and tasked with promoting the development of markets for recycled materials, has published a work programme that contains a number of measures that will contribute to the development of a market for treated OFBMW outputs.¹⁹ The measures include

- Develop consumer and public confidence in OFBMW products. One element of this work is to develop nationally recognised standards for OFBMW products.
- Undertake marketing campaigns targeting both domestic consumers (i.e. home gardeners) and specialised groups (e.g. horticulture and organic sectors) to stimulate demand for OFBMW products, which will also serve to increase product awareness and confidence.
- A requirement on all public bodies to utilise compost or other similar products derived from OFBMW would provide a direct and immediate support to the market. Such a measure is unlikely to have a significant additional cost implication, as budgets are already allocated for landscaping, etc. The second immediate benefit from such a procurement policy is that it guarantees market demand, and therefore increases confidence for waste contractors considering investment in new infrastructure.

Additional measures that could contribute to the development of a market for treated OFBMW outputs include:

- A detailed analysis is required to determine the suitability of OFBMW products (especially compost) for land remediation, which in turn would contribute to a national inventory and plan for the remediation of contaminated sites.²⁰ This information would help identify waste infrastructural requirements and potential market outlets for compost and other OFBMW products.

¹⁹ "Market Development Programme for Waste Resources 2007-2011", Market Development Group, Department of Environment, Heritage and Local Government)

²⁰ Such a plan might be implemented via ministerial policy directions as set out under section 60 of the Waste Management Act, 1996. The proposed EU Soils Directive COM(2006) 232 contains similar provisions including setting up an inventory of contaminated sites and establishing a national strategy for remediation of the contaminated sites identified

Research and guidance is required to establish whether there are any environmentally sound reuse/recycle options for stabilised biowaste. The figures in Table 2 suggest that up to 250,000 tonnes of stabilised biowaste will be produced per annum but the current management options for stabilised biowaste are limited to landfill and incineration.

Conclusion – Without new market research on the true extent of the potential market for treated OFBMW products it would be unwise to invest in expensive treatment technology to produce outputs for which a market might not exist. The alternative management options, whether for high quality compost or stabilised biowaste, are landfill or incineration.

For Consideration –

- Provide guidance on all the permitted uses of stabilised biowaste including the identification of all suitable sites and their potential annual demand.
- Undertake research to better understand the potential demand for treated waste products, including identifying issues important for the general public's acceptance of using treated waste products on land.
- Develop nationally recognised standards for waste products derived from OFBMW.
- Undertake marketing campaigns and other initiatives to stimulate demand for products derived from OFBMW.*
- Develop a national inventory and plan for the management of contaminated and other sites that could benefit from the use of OFBMW products, including maps identifying such sites.
- Initiate a green procurement policy requiring all public bodies to utilise compost or other similar products derived from OFBMW.*

* The Market Development Group has published a work programme that addresses these areas.

5. Economic viability, environmental sustainability and value for money in the waste management sector

New infrastructure and systems to treat an additional 900,000 tonnes of OFBMW is envisaged in the national biodegradable waste strategy. Choices on the mix of that infrastructure, as well as policy and regulatory decisions impact on the economics and sustainability of the waste management sector and on whether the services provided are value for money to its customers.

5.1 Economically viable

An economically viable waste management sector is paramount for the safe and effective collection and treatment of waste. Policy and regulatory control are important elements in achieving a stable and well-managed sector but equally can affect the economic viability of the sector and its willingness to further invest in waste management services.

5.2 Environmentally sustainable

The environmental sustainability of a particular waste management treatment approach entails more than just what happens the waste but incorporates all the energy and resources used in its collection, treatment, distribution and if relevant disposal. While individual technologies may routinely be considered more sustainable than others (e.g. MBT versus incineration versus landfill) the true measure of whether a waste management system is environmentally sustainable incorporates all the stages of waste management and what ultimately happens to the waste stream. Sustainability of technologies cannot be assessed in isolation. An environmentally sustainable management system will not necessarily be the least cost option but it should provide value for money.

5.3 Value for money

Value for money entails providing a service of specific standard cost efficiently (it does not mean providing any service irrespective of standard as cheaply as possible). EU and national waste regulations, waste policy hierarchy and waste targets set out the management standards we aspire towards. Achieving value for money for customers entails cost efficient compliance with those standards. If value for money is to be a guiding principle, the decision on the national technology mix for OFBMW management, subject to environmental standards (that incorporate environmental sustainability), should be based on the relative cost efficiencies of the various treatment systems. In practical terms where multiple treatment options are available for managing waste streams, subject to the required standards, and produce similar outcomes for the waste material, if cost is not a determining factor in the technology mix, the cost of waste management will be higher than is necessary to achieve compliance with the standard we aspire.

6. Summary – Ten policy options for consideration

Within 3 years Ireland must completely change how it manages OFBMW and by 2016 it must develop in excess of 1 million tonnes of additional capacity. A number of initiatives are already underway to affect change, however, many obstacles remain and further active policy intervention, the most significant of which are outlined below, is required if targets set for diversion of biodegradable municipal waste from landfill are to be achieved.

6.1 Promote at-source composting

Composting organic waste at source is possibly the most cost efficient and environmentally sustainable approach to manage OFBMW. Consideration should be given to measures to directly or indirectly incentivise households and businesses to compost on site.

Home composting, where feasible, is a more sustainable option than centralised treatment. The biodegradable waste strategy envisages some 92,000 tonnes per annum of OFBMW to be home composted by 2016. Local authorities already encourage home composting and in many cases have subsidised home composting bins. Increasing waste disposal costs will encourage more home composting but additional measures may be necessary to achieve the target levels for home composting.

6.2 Expand R&D for at-source composting

Many households engaged in home composting are advised to compost only specific elements of available OFBMW. Additional research is required to learn how home composting can treat the greatest proportion of domestic OFBMW and therefore contribute to diversion of a greater amount of material from the residual waste stream. In addition many households encounter bad experiences with home composting or achieve poor composting results. Provision of ongoing composting demonstration and assistance to householders would help improve the level and performance of home composting.

Businesses face similar problems as households with OFBMW. Availability of easy-to-use self-contained composting systems with minimal maintenance and management requirements would encourage more businesses to compost on-site. Research to develop such systems, which are economically viable would contribute to the improved management of OFBMW from this sector.

6.3 Ban the landfill of untreated municipal waste

Consideration should be given to imposing a national ban on the landfill of untreated municipal waste, which would significantly reduce the amount of biodegradable waste being landfilled. A range of treatment options is available including those that occur at collection and subsequently.

6.4 Increase the landfill levy

➤ **Landfill levy**

A higher landfill levy would increase the incentive to divert wastes to alternative treatments. Revenue from the increased levy could fund initiatives that specifically target OFBMW diversion and treatment.

➤ **OFBMW landfill levy**

A landfill levy specifically targeting OFBMW would rebalance the economics towards OFBMW treatment rather than disposal.

6.5 Undertake market research for treated OFBMW products

Additional research is required to gain a better understanding of the potential demand for treated OFBMW products, including identifying issues important for the for general public's acceptance of using treated waste products on land.

6.6 Provide a subsidy for the treatment of OFBMW

A subsidy on treated OFBMW conditional on quality would provide an incentive both to divert OFBMW from landfill and to invest in collection/treatment systems that yield more sustainable outputs. A subsidy of this type should be viewed as short-term support to encourage desired changes in the market. Specifically in the case of anaerobic digestion additional intervention may be required to realise the extra benefits associated with the technology.

6.7 Develop and assign responsibility for a national waste management plan

A detailed national waste management plan should be developed to guide all stakeholders involved in the waste management sector. A national waste management plan should cover all waste streams, not just household or OFBMW, and should provide detailed guidance on waste infrastructural requirements. Responsibility for driving the plan must be assigned. A national plan would overcome the deficits in regional waste management plans and provide clear guidance to planning officials and waste regulatory authorities. It would also provide clarity to investors on the consistency and compliance of their infrastructural projects with national waste and planning policies.

6.8 Develop guidance on waste infrastructure and contaminated sites

➤ **Site selection for OFBMW facilities**

A national guidance on waste infrastructure site selection is required, possibly as part of a National Waste Management Plan. Such guidance would help ensure uniform rules across planning authorities and also ensure the wider implications for waste management are not overlooked.

➤ **Contaminated Sites**

Develop a national inventory of contaminated land and other sites that could use OFBMW products in their remediation. The inventory should quantify both the location and extent to which OFBMW products will be used in this work, which in turn would inform the waste infrastructural requirements within a national waste management plan.

6.9 Develop stabilised biowaste standards

The EPA is currently funding research to develop a national standard for compost. Similar research is required to develop a better understanding of the properties of stabilised biowaste and establish national standards for the material.

6.10 Encourage green procurement and undertake marketing of OFBMW products

A mandatory requirement on public bodies and their contracted suppliers to source OFBMW derived products in their landscaping activities would create a strong base demand for the market.

Marketing and other initiatives to stimulate demand for products derived from OFBMW are necessary. Significant growth in demand for products derived from OFBMW is dependent on changing behaviour and attitudes. Changes in behaviour can only occur when consumers have real choices, therefore, marketing campaigns must be closely integrated with other developments in OFBMW management.



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