

WASTE POLICY, PLANNING AND REGULATION IN IRELAND

FINAL REPORT FOR GREENSTAR

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PREFACE

This work was funded by Greenstar, Ireland's leading waste management company, in the interests of stimulating debate and informing and improving future decision making. The report is an independent review conducted by Eunomia Research & Consulting Ltd., a leading European waste management consultancy, with the assistance of Patrick J. Tobin & Co. Ltd. It seeks to pass comment on some key issues confronting Irish waste management as it continues to make progress. It is not comprehensive in this regard. There are a number of issues which remain relatively unexplored which others will, no doubt, feel were more deserving of comment.



Eunomia Research & Consulting Ltd was formed in 2001 to deliver high quality consulting services in the waste, recycling and material flows sector. Based in Bristol, the company is widely considered to be a market leader both in the UK and Europe, providing strategic, technical and policy advice to public and private sector clients, and NGOs. The company has a reputation based upon the provision of impartial and insightful analysis and its work is widely read by experts in the field across Europe. Clients have included the OECD, European Commission, Defra, Welsh Assembly Government, National Treasury (Republic of South Africa), Cabinet Office Strategy Unit (UK), Friends of the Earth, UK and Greenpeace.



TOBIN Consulting Engineers, founded in 1952, provides civil, structural, environmental and project management consultancy services from a national network of offices for a wide range of public and private infrastructure in Ireland. TOBIN has authored waste management strategies and plans for the North East and Cork regions; has co-authored the first National Hazardous Waste Management Plan for the Environmental Protection Agency; provides a National Litter Monitoring service to the Department of Environment, Heritage and Local Government; and co-authored a Methodology for Risk Based Enforcement of Licences for the Office of Environmental Enforcement. TOBIN provides planning, design and construction management for a wide range of waste management facilities for public and private sector clients, including landfills, civic amenity sites, materials recovery/recycling facilities and composting plants. It undertook additional research and consultation for Eunomia in the preparation of this Report.

EXECUTIVE SUMMARY

Irish waste management has made enormous strides over the past decade. As well as reducing the environmental impact of existing landfills, significant steps have been taken, especially in respect of commercial and industrial waste, to increase the quantity of material being recycled and reduce the country's heavy reliance on landfill. Ireland has made significant strides towards a more sustainable management of resources in the waste stream.

This report, whilst recognising the enormous changes which have been implemented over the last decade, is intended to provide a provocative and critical review of where Ireland currently stands, and where it might be in the future. It does not cover all issues, but some which have come to light in reviewing the existing state of affairs. It comes at a time when waste management activities - like many others - are being increasingly closely scrutinised through the lens of climate change.

DATA

The report finds that the quality of data appears to be improving over time. The efforts of the Environmental Protection Agency (EPA), the local authorities and private sector companies appear to be bearing fruit, though confidence in the data must remain limited as long as some of the major obstacles to completing the picture remain to be dealt with (for example, data associated with households receiving no formal collection service).

Rather more worrying is the way the data which does exist has been interpreted, both in national policy documents, and in Regional Waste Management Plans (RWMPs). We have seen little by way of coherent analysis supporting waste projections, with an enormous gulf now existing between what is projected nationally, in the National Biodegradable Waste Strategy, and the figures one derives from the sum of all the projections (where they are made) in the RWMPs.

Looking forward, there remains a question as to how waste data can be made still more reliable in the future. One possibility would be to ensure that the auditing of that data which is gathered is collated and examined thoroughly. It seems less than clear that the local authorities should be effectively auditing their own data, as well as that of others. An independent audit of data would be more appropriate.

Where national policy documents and RWMPs are making forward projections (as indeed they

should), far greater care and attention needs to be taken in making such projections. As far as possible, projections should be made at that level of government with the greatest influence over the waste stream concerned.

TARGETS

We could find little by way of underlying logic for the targets set in national policy documents or those in the RWMPs. The principal national policy targets were set almost a decade ago. There appears to be little appetite to revise these in the light of experience, even though some such targets - set for the next decade - are probably already being achieved.

Much the same applies to the RWMPs. There is no consistent logic across the RWMPs in respect of target setting. Some of these targets already are being, or will very soon be, met. In some cases, recycling targets for commercial waste are in excess of those for household waste, in others the reverse is true. There is not always a clear time horizon for the achievement of the stated targets.

The national policy targets and those in the RWMPs deserve to be reappraised. If there was little by way of clear logic for their initial levels, now is the right time to take stock of progress and consider how the future of waste in Ireland is to be conceived.

DATA, PROJECTIONS AND TARGETS

Taken together, the quite recent emergence of data of the requisite quality, the relative absence of decent projections (and interrogation of, as opposed to mere presentation of, data at the regional level), and the lack of rationale for the targets already set form a potentially damaging cocktail. In order to assess capacity requirements in the context of a desire to retain flexibility to 'do better' than anticipated, a better understanding of all three is required. In the recent revision of plans, relatively few alterations were made to the approach set out in the first round of RWMPs. This reflects, in part, the lack of analysis already referred to.

To follow the RWMPs as they are currently set out may be counter-productive. We would suggest that the RWMPs be reviewed by an independent body, and the targets established therein scrutinised so as to minimise the potential for regret in the context of future developments in Irish waste management.

THE LANDFILL DIRECTIVE

National policy documents did not give much thought to meeting Landfill Directive Article 5 targets until the draft National Biodegradable Waste Strategy in 2004. There remains a lack of a clear mechanism for meeting these targets. Policy instruments with the potential to have an impact exist. However, time is running out for Ireland. Time has become a precious resource for the country as it seeks to carve a trajectory towards compliance.

WASTE COLLECTION AND IMPACTS ON INFRASTRUCTURE DEVELOPMENT

The system of waste collection in Ireland is one in which users are free to choose who the supplier of their collection service is. In this way, the system is different from that which functions in many other countries, at least where household waste is concerned. The market is unusually 'free' in this regard.

There are a number of reasons why this might not be the best approach for dealing with waste collection. The cost of household waste collection and treatment / disposal in Ireland is not especially low, even accounting for what have been relatively high disposal costs in recent years. In addition, the encouragement given to all waste collectors to move to full cost recovery implies that at the margin, some customers, notably those in sparsely populated areas, are likely to be faced with high tariffs. Finally, the encouragement given to extend, universally, pay-by-use has given rise to a variety of rate structures reflecting the different approaches of different actors in the market for waste collection (and associated) services.

Our view is that the uncertainties which this situation creates, in terms of being able to command a part of the waste stream, and the nature of incentives facing households, are likely to be, at least in part, responsible for the slower evolution in household waste recycling rates than might have been expected in a situation where pay-by-use is in place and where disposal costs have been high. In addition, the existing market may tend to depress the proportion of households who choose to avail themselves of a formal collection service, whilst high marginal costs for sacks, or for bin lifts, are also likely to act as an incentive to act illegally.

The lack of security of access to the waste stream also has implications for the development of what

we term 'throughput' facilities, i.e., those whose capacity to treat waste is relatively constant in any given year, whose lifetime is more-or-less fixed, and whose bankability, therefore, is contingent upon being confident of securing access to a significant proportion of total capacity over the facility's lifetime. It is difficult to guarantee such security of waste supply in a context where the market for waste treatment services is competitive. It is surprising, in this context, that most of the RWMPs proposed thermal treatment as the preferred option for dealing with residual waste. Arguably, such facilities were the ones least likely to be built in the current institutional framework.

The Department for Environment, Heritage and Local Government (DOEHLG) needs to consider whether the existing institutions governing the market for waste collection are the right ones. The desire to foster a competitive waste market may potentially result in increased costs to householders, whilst also limiting the evolution of the services which might be offered (and hence the recycling rates achieved). In the short term, Ireland needs to be confident that the market will – in future – deliver the right balance of outcomes in terms of performance and cost. This is a prior question which needs to be answered before the issue of whether, and if so, what type, of regulator might be needed. It is also, logically, a prior question to the one of understanding how the market can deliver the non-landfill waste treatments which are needed in the future.

If the market is left in its current state, then the following options would be worth considering so as to give greater confidence to investors, though none necessarily secures delivery of waste to a *specific* facility:

- a) employ market-based instruments to give greater certainty regarding the price of different treatments. The current situation is one where a landfill tax exists; but there is no tax on incineration (the analysis in the main document appears to suggest that there is an argument in its favour). The landfill tax is at a relatively low level, partly one assumes due to the high level of pre-tax gate fees. These are, however, beginning to fall as competition increases, and void space availability improves;
- b) employ regulatory instruments restricting the quantity of waste which can be landfilled.

This could either be through setting pre treatment standards for all landfilled waste or through some form of allowance trading mechanism, as applied in the UK (albeit, in that case, only applied to biodegradable municipal waste);

- c) require authorities to tender services in their area on the understanding that the winning tenderer has exclusive rights to collect waste in that area (and discussion would need to occur as to whether this was appropriate for all waste, or only household waste, with the latter being the more likely outcome).**

a) and / or b) could be combined with c).

RESIDUAL WASTE TREATMENT

Ireland does not have the characteristics of a country where the obvious solution to dealing with waste is incineration. Such facilities suffer diseconomies of small scale and the dispersed nature of the population outside a small number of urban centres would tend to lend itself to a more decentralised approach to dealing with waste. With few exceptions, the RWMPs in Ireland, encouraged by national policy statements, all include thermal treatment within their mix. In some cases, it is proposed that single facilities should be located in an extreme corner of a very large geographic region.

Our review highlights a virtual absence of consideration of any facilities which are not thermal in nature for the treatment of residual waste. Given the lower capital cost of alternatives and the fact that significant diseconomies of small scale kick in at much lower levels for some such facilities, the absence of consideration of them constitutes a blind spot in Irish waste management policy, plans and regulation. This is all the more significant given

- a) the existing market situation for waste collection services;
- b) that lead times for such facilities may be much shorter than for incinerators and time is something which is running out for Ireland if it is to comply with its obligations under the Landfill Directive.

There seems to be a predisposition not only towards thermal facilities but, perhaps because it has been accepted as an article of faith that facilities will be thermal, towards facilities of large scale. This would

imply that the more progress Ireland makes in the high-in-hierarchy options, the larger the catchment area for waste would need to be to maintain the viability of the investment. This has costs of its own (in respect of haulage costs, for example), calling into question the validity of arguments based upon the technical economies scale offered by a given facility.

The supposed superiority of incineration as a treatment for residual waste is increasingly called into question. Analysis undertaken for this report indicates that environmental costs for incinerators are not necessarily lower than those for landfills. This is consistent with work undertaken in the UK by HM Customs & Excise, following on from earlier work for Defra on the Health Effects of Waste Management Options and recent work in the Netherlands. Our estimate is based upon damage costs associated with air emissions as estimated in work undertaken for the Clean Air for Europe Programme. It does not include an estimate of the external costs of disamenity effects. These, however, have the potential to be significant for incinerators by virtue of the typically high housing densities around such facilities.

Furthermore, it is not clear that where incinerators are configured to generate electricity only, their impact on climate change is positive. If it is correct to assume that over the lifetime of the facility, the carbon intensity of displaced energy generation is similar to that of combined cycle gas turbines, then incinerators generating only electricity are net contributors to greenhouse gas emissions and not, as commonly stated, helping to reduce such emissions. Other waste treatments would appear to perform better in respect of climate change and not all of these generate energy.

There is a pressing need to consider whether the capacity for treating biodegradable municipal waste – anticipated as necessary in the National Biodegradable Waste Strategy for meeting Landfill Directive targets – is likely to be delivered in the remaining time available (before 2010).

It would appear that Ireland needs a Plan B (something other than incineration). DOEHLG and the EPA should consider introducing clear regulations regarding:

- **which output materials from biological treatments can be used for what purpose, in what quantities and with what frequency of application;**
- **the effects of biological pre-treatment on the biodegradability of waste. This would enable local authorities to consider alternatives (to incineration) in the context of their RWMPs as a means to deliver targets set out in the Landfill Directive.**

FLOW CONTROL

Despite the prominence of incineration as the preferred solution for residual waste in national policy and the RWMPs, not one has yet been built in Ireland. This is partly for reasons already discussed. This has given rise to discussions around the potential role of a waste regulator in directing waste to specific facilities, a matter which seems to be particularly well adapted to suit the needs of the proposed incinerator at Poolbeg in the Dublin area. The capacity for this facility, quoted at 400,000 -600,000 tonnes, is, at its upper end, greater than the total quantity of residual household, commercial and industrial waste which the RWMP anticipates will be generated in 2013 if its own recycling targets are met.

Our own view is that such an approach – directing waste to a specific facility – may not be legal under EU law. Another alternative – that local authorities might do this through the existing system of Waste Collection Permits – would seem likely to find no favour with competition authorities as long as local authorities themselves had some stake in the provision of collection services or in the facility concerned. The local authorities, being responsible themselves for issuing waste collection permits, could readily be accused of acting to improve their competitive position in the market place.

Finally, to the extent that flow control is implemented – as it seems is being proposed in Dublin – through the collection permits issued by local authorities, then clearly local authorities potentially become both poacher and gamekeeper. Indeed, the advent of flow control potentially stifles investments by the private sector other than those which are deemed fortunate enough to be the subject of flow control laws. Why would private investors seek to develop facilities which might subsequently find their access to waste cut off by

mechanisms which effectively create a monopoly? This would raise all sorts of question as to what price collectors – and hence, their customers – will be asked to pay to run material through the facility which they have no choice other than to pay to use.

The fact that the issue of flow control is raising its head highlights the existing mismatch between the institutions in the market place and the preference, in national policy and the RWMPs, for residual waste treatments which will not be viable without additional interventions in the market. Flow control is one – possibly the worst, and potentially illegal - mechanism to deal with the situation. Where incinerators are concerned, under existing EU law, the approach implies directing waste to disposal facilities. The flow control issue sits uneasily alongside an otherwise liberal approach to the market for waste management services. Whilst implementing flow control may be attractive to ensure the Dublin incinerator becomes commercially viable, wider questions concerning the scale of the proposed facility, as well as the wider policy framework and the decisions made in existing RWMPs, are deserving of review in the context of the slowness of progress in implementing any form of residual waste treatment infrastructure in Ireland (which sits, incidentally, in stark contrast to the pace of change in many other respects). This is partly because the business case for anything other than incineration has been difficult to make, whilst the institutions in the market place have made incineration too risky from a commercial perspective.

MBT

There are alternatives to thermal processes for dealing with residual waste in such a way as to comply with Landfill Directive targets. Enabling regulation is required, this being the responsibility of DOEHLG.

National policy documents and the RWMPs have rather scant information, if any, on these. The NBS notes:¹

“There will be a certain amount of biodegradable municipal waste for which it is not feasible to achieve a sufficient level of segregated collection to satisfy the required landfill diversion targets. Accordingly, there will also be a need to collect this material as residual BMW and to provide treatment – either thermally or through some form

of stabilisation – to reduce the biological activity to imperceptible levels and thereby ensure achievement of the mandatory diversion targets.”

Later, it states:

“A Study is now being carried out into the potential contribution of MBT to biodegradable municipal waste management in Ireland under the ERTDI Programme and will inform future policy.”

Without this it will be very difficult to put together a sound business case for any potential MBT projects that do not rely on the product going to an existing thermal facility.

The potential value of MBT processes include that:

- **they can help to meet Landfill Directive targets;**
- **the simpler forms have a low unit capital cost (even at relatively small scale);**
- **several designs are quite flexible in terms of their operation;**
- **they can be constructed relatively swiftly.**

For Ireland, MBT processes would seem to have much to offer. However, without the enabling regulation, they will remain under-utilised, increasing the likelihood that Ireland will fail to meet Landfill Directive targets simply because the preferred option – thermal treatment – is likely to take too long to implement.

ISSUES OF COMPETITION

In the existing situation, local authorities:

- are responsible for issuing waste collection permits, and may influence the terms of these;
- have the power to develop bylaws influencing, for example, the way waste materials are presented;
- can engage directly in waste collection activity;
- are responsible for developing RWMPs, with the County Manager effectively having the power to sign these off;
- are responsible for waste planning issues (insofar as these are not major projects, or PPP projects – see below);
- are likely to submit planning applications for landfills and other waste management facilities in their own right;
- may operate facilities in their own right.

That the position of local authorities vis-à-vis their private sector competitors is somewhat preferable

has been recognised by DOEHLG in its Consultation Paper on the Regulation of the Waste Sector².

If the aim is to harness competition, and to allow local authorities to act as competitors in the market, then it seems very clear that the potential for abuse – whether this is real or merely perceived – ought to be removed. Local authorities currently have a wide range of powers which enable them to make decisions which, irrespective of the soundness of the basis for making them, are likely to give rise to considerable suspicion. Their ability to do this ought to be curtailed.

CONSULTATION

Communities generally seem to feel disenfranchised when they become involved in the decision making processes regarding waste management. There is limited evidence of serious attempts to pro-actively engage communities at an early stage in the development of waste management plans. Communities’ experience of the planning process has not always been positive, and there are concerns that the Strategic Infrastructure Act will herald a reduction in the significance accorded to the views of communities.

The views of communities cannot be overlooked in making, and in implementing, waste management decisions. Particular care should be taken to ensure that planning applications made under the Strategic Infrastructure Act give communities, most of whom are not well-resourced, sufficient time to make submissions of the quality they are capable of making.

GLOSSARY OF SELECTED TERMS AND ACRONYMS

BAT

Best Available Technique. This concept acquires significance through the implementation of the IPPC Directive, which requires that installations covered by the Directive should demonstrate that they will operate using BAT before they are awarded an authorization (a pre-requisite for (continued) operation.)

BMW

Biodegradable municipal waste. This includes, for example, the following wastes: paper, card, food wastes, garden wastes, wood, textiles made from natural fibres, parts of shoes, etc.

BREF

Best available technique reference document. These documents are produced by the European Integrated Pollution Prevention and Control Bureau and Member States are required to take these into account when determining Best Available Techniques (BAT) in their own country.

CAFÉ

Clean Air for Europe. This was the name given to a programme of work and investigation looking at the current implications of prevailing regulations regarding air quality for human health and the environment.

CBA

Cost benefit analysis. This is a technique used to understand whether the costs of a particular action are justified by the benefits likely to flow from that action. In particular, CBAs attempt to assign monetary values – using various techniques – to those effects which have no value in any market place, for example, impacts on health and the environment.

CCGT

Combined cycle gas turbine. This is a common way of generating electricity from natural gas.

CEWEP

Federation of European Waste to Energy Plants. This is a body which represents more than 200 waste management plants from across Europe. The term 'waste-to-energy' covers, in this context, plants which treat waste using thermal processes only.

DOEHLG

Department of Environment, Heritage and Local

Government.

ECJ

European Court of Justice.

EFW

Energy from waste. This is a term frequently used – somewhat misleadingly – to refer to incinerators. There are all sorts of ways of deriving energy from waste, not merely 'incineration', but the term is usually used to refer to incineration only.

EPA

Environmental Protection Agency.

EU

European Union.

FEAD

Federation Europeenne des Activites du Dechet et de l'Environnement (European Federation of Waste Management and Environmental Services). This organisation is effectively an umbrella organisation which acts at the European level on behalf of organisations at the set up at the Member State level to represent the interests of the waste management and environmental services sector.

GNP

Gross national product. A measure of the overall economic activity of a nation.

HEDONIC PRICING

An approach which relies on using the impact of a change in a specific market to elicit the value of the change in monetary terms. This can be used to assign a value to the disamenity associated with developing waste facilities through understanding the effect of the development on house prices.

IPPC

Integrated pollution prevention and control. Under the IPPC Directive (96/61/EC (as amended)), facilities undertaking one or more of a range of activities are required to obtain a permit from the relevant authority. Regulators must set permit conditions so as to achieve a high level of protection for the environment as a whole. Conditions are based on the use of "best available techniques" (BAT - see above).

LCA

Life-cycle assessment. This is an approach (one of many) used to understand the environmental impacts of different activities. It aims to identify flows of pollutants associated with the activity through tracing the effects of up- and down-stream processes on the environment, including the benefits of avoiding pollution which would have been generated if the activity had not taken place.

MBT

Mechanical biological treatment. This is a generic term covering a range of technologies for dealing with residual waste. The common theme is the integration of mechanical sorting and feedstock preparation alongside biological treatment of some part of the waste, either using aerobic processes or anaerobic processes.

MSW

Municipal solid waste.

NBS

National biodegradable waste strategy.

NCV

Net calorific value. This is used to denote the energy content of material when combusted, taking into account the fact that materials which have some moisture within them do not deliver as much energy as would be the case if the material was completely dry.

PBU

Pay-by-use. This is the system used to charge households in accordance with the level of use of the waste management service.

RDF

Refuse-derived fuel. Some processes for treating waste deliberately set out to extract a high-calorific fraction from the waste. In these cases, the intention is usually to market the high-calorific material to possible users. This material is given various names, of which RDF is one. For legal purposes, this material is still classified as a waste, not a fuel.

RWMPs

Regional Waste Management Plans

WEEE

Waste Electrical and Electronic Equipment.

WTE

Waste-to-energy. As with EFW above, this is a term used to describe incineration. It is somewhat misleading since, as with EFW, there are many 'waste-to-energy' pathways, not only incineration.

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1.0 INTRODUCTION

Irish waste management has made enormous strides over recent years. As well as reducing the environmental impact of existing landfills, significant steps have been taken, especially in respect of commercial and industrial waste, to increase the quantity of material being recycled and reduce the country's heavy reliance on landfill.

Since the passage of the Waste Management Act of 1996, the sector has witnessed major changes at a time when the economy has been growing significantly, and population has been increasing. The sector continues to develop and to generate change. Challenges remain to be addressed, however, and the speed with which they need to be addressed is significant.

This aim of the report is to stimulate debate and informing and improving future decision making. It sets out to:

- Present a view as to the positive and negative features of the Irish waste management system;
- Examine what appears to have come to represent 'orthodoxy' in Irish waste management (and to understand how this orthodoxy emerged);
- Propose, where appropriate, alternative approaches to the management of waste in the country in the areas of:
 - Policy;
 - Planning;
 - Regulation;
 - Practice.

It is not a comprehensive review. The intention has been to focus on some key issues emerging. There are a number of issues which remain unexplored which others will, no doubt, feel were more deserving of comment than some of the matters raised here.

It is worth making one point absolutely clear from the outset. No country, still less, a small group of consultants, has a monopoly on knowledge as to what is 'the right way' to manage waste in a given context. This document is, however, intended to provoke debate around the direction which waste management is taking, the way in which policy has developed to help secure delivery on stated objectives, and the way that waste management might change in the future.

1.1 APPROACH

The approach to the work has been based around:

- a) Critical review of key documents;
- b) Meetings with key stakeholders;
- c) Further detailed discussions with Greenstar staff;
- d) Additional analysis, both original and that based on existing work, as appropriate.

The degree to which b) has been possible has been determined partly by available time and resources. We are grateful to those who have helped us in our investigations.

2.0 OVERVIEW

Irish waste management is changing rapidly. Everything is changing – quantities being dealt with, the way the materials are dealt with, the systems used to collect waste, the basis for financing waste initiatives, the regulatory framework, the costs – the list goes on. The situation is unrecognisable from the one which prevailed 10 years ago. The transformations underway are, and indeed must be, profound as Ireland seeks to deliver on its own aspirations for waste management in future, and on the targets it faces under European law.

This presents challenges, but also, opportunities. Ireland has the potential to make use of its 'late-mover' advantage in seeking to leap-frog in performance over the supposed 'leaders' in European waste management. In particular, the opportunity exists to seek to learn from experience – good and bad – from elsewhere to adopt features of those systems intended to deliver the best outcomes for the country as a whole. The challenge lies not so much – as is often supposed – in the targets from EU legislation, such as the Landfill Directive, but in designing institutions to structure the markets for waste and resource management in such a way that implementation proceeds effectively, and that the desired outcome is delivered.

The concept of 'institutions' as used in this report will be a new one to some readers. Institutional economists are a particular breed of economists who take the view that no markets are 'free' in the sense which 'free marketeers' tend to imply. All markets are structured by the actions of the state and other bodies (and if they were not, the transactions which routinely occur in the market place between actors who have no prior knowledge of each other would probably not occur). The term 'institution' is intended to refer not to organisations, or government departments, or the European Commission, but to the rules and norms, formal and informal, which effectively govern the playing field upon which actors involved in a given market must compete. Particularly in the Irish context, where competition has been given fairly free rein, it is important that the institutions – the rules governing the game – are fit for purpose. They need to be capable of delivering the desired waste management outcomes.

This paper is not just about 'institutions'. It is also about the nature and quality of analysis which underpins waste policy documents and regional

waste plans. These documents are part of the institutional framework insofar as the key legislation in Ireland – the Waste Management Act, 1996 and the Waste Management (Amendment) Act, 2001 – sees the production of, for example, waste plans by local authorities as a key mechanism by which the strategic management of waste could be developed.

Finally, it is also about how the actors which play a role in waste management, including households and businesses, function in the context of existing institutions. We seek to understand the degree to which what is expected of different actors can be said to be reasonable in the context of the existing rules of the game.

2.1 IRELAND'S PROGRESS

It would be wrong to undertake a critical review such as this without first acknowledging the significant progress made thus far in the area of waste management. In many countries, where a key issue has been to ensure proper disposal of wastes (as opposed to relatively uncontrolled dumping), the first task is to ensure that an increasing proportion of waste enters 'formal' and regulated channels. This, in itself, is no trivial task (not least since a properly regulated waste sector often implies higher costs for waste producers than an unregulated one). Usually, countries seek to make progress in improving performance in respect of waste prevention, recycling, and treatment once the proper regulation of waste has been achieved. Ireland has effectively had to do both, simultaneously (and some of the new EU Member States are currently facing a similar challenge).

The transformation has been profound. One can note the following changes as being of considerable significance:

- a) Licensing / regulation of landfills and closure of facilities which were not up to standard. The number of landfills operational in the country fell from 95 in 1998 to around 30 in 2004;³
- b) The introduction of a Landfill Levy;
- c) The introduction of novel policy instruments, such as the plastic bag levy, which have been seen as progressive by many other countries observing their progress;
- d) Implementation of Producer Responsibility for packaging and WEEE;

- e) The introduction of universal pay-by-use (PBU) for household waste collection (though there may be reasons to have reservations concerning this in the Irish context);
- f) Increase in recycling of municipal waste from an estimated 7.8% in 1995 to 34.6% in 2005;⁴
- g) The development of a National Waste Prevention Programme, fronted by the EPA;
- h) The development of an Environmental Fund, using revenues from levies on landfill, plastic bags, etc. to support investments by local authorities;
- i) The development of a national campaign on waste issues, Race Against Waste;
- j) The development, more generally, of infrastructure to deal with waste through means other than landfilling.

These are significant achievements, and demonstrate the commitment of the parties involved to, as one of the early policy documents would have it, 'change our ways' in Ireland.

Yet there remain a number of outstanding questions regarding the future. Indeed, this appears to be recognised by Government in the recent Consultation on the possible need for (or not, as the case may be) a regulator for the waste management market. It may be early days for Ireland, and there are clearly questions as to the nature and extent of change which may yet occur under existing arrangements. But there are already some warning signs. Concerns which have been expressed to us, in the context of our discussions with stakeholders, include (amongst others):

- Quality of data and analysis thereof;
- The level of public involvement in the development / formulation of waste plans and revisions thereof;
- The extent of similarities across waste management plans, and notably, the wisdom of proposing thermal treatment facilities in every region of Ireland;
- The fact that households need not be 'connected' to a household collection system, and the potential consequences thereof;
- The extent of illegal activity, either by households or businesses;

- The emerging contradictions associated with a free market for waste collection, set alongside a desire to ensure new capital investments are made in the country;
- Issues around 'flow control' and the possible role of a regulator.

Most commentators see the turning point for Irish Waste Management as being the Waste Management Act 1996. This act introduced environmental concerns into what was a previously largely unregulated area of activity. At the time the Act was written, waste management involved the dumping of waste into landfills, many of which were poorly engineered and regulated. The costs of this activity were low. At the time, all active landfills were publicly owned. Prices may or may not have been high enough to allow the low costs of operation to be covered, but no element of profit would have entered into the financial calculus. The Act, later expanded in planning regulations (1997) and through the policy statement *Changing our Ways*,⁵ aimed to reduce the amount of waste sent to landfill and move waste to treatment methods further up the waste management hierarchy.

Less often discussed in the literature is the nature of collection systems, and in particular, the collection services offered to households. Many households in Ireland were used to receiving services from local authorities which were funded by bin charges. The charges did not always cover all costs. Sections 33 and 34 of The Waste Management Act set out the responsibilities of local authorities in respect of collection, and set out how private sector collectors could operate under permits awarded by the local authority or other authorities as set out in the Waste Management (Amendment) Act, 2001. This has led to a relatively free market approach to collection which has potential drawbacks in respect of ensuring all households and enterprises are 'connected' to a collection system, and in ensuring facilities which entail significant capital investment are reliably supplied with waste to make the investment bankable.

These are among the issues taken up in later sections of this report.

3.0 FUNDAMENTALS

This section looks at the issue of waste data, the quality of that which exists, and the quality of the analysis of the data which is available.

Those with experience of waste data are generally forced to accept that the quality of data is 'never what it might be'. There is almost always much to be desired, no matter where one is. In some countries, some local authorities are very good at capturing data. National data, however, is usually composed of an aggregation of datasets of mixed quality, or data based upon surveys which may or may not be representative.

The issues associated with – and the accuracy of – the collection of waste data are also related to what types of waste one is seeking to monitor. In most EU countries:

- a) Data on waste collected by, or on behalf of, local authorities seems to be improving. However, in different countries, what is collected 'by or on behalf of' local authorities varies. It also varies within countries, with the variation generally relating to the extent of involvement of local authorities in commercial waste collections. In those authorities where household and commercial wastes are co-collected on the same vehicle, then only where on-vehicle weighing systems are in place is there likely to be a reliable split between the household and the commercial waste quantity;
- b) In most countries, collection of commercial waste is more open to 'spot market' competition than are household waste collection services. This can imply that many collectors are involved in commercial waste collections. The collection of this data, in a co-ordinated fashion, is not always as focused as with wastes collected by local authorities;
- c) Construction and demolition waste arisings are notoriously difficult to estimate. The nature of construction offers opportunities for on-site re-use and recovery, as well as transfers across from one site to another for the same purposes. Consequently, the amounts actually generated can be opaque. The inert nature of much of the material lends itself to use in landscaping, whilst

material delivered to landfills may be used for site engineering. Finally, some materials which are not inert may accompany those which are in some of the aforementioned activities. For these reasons, construction and demolition wastes present particular challenges to those seeking to understand or analyse the quantity of waste arising.

These points are worth stating at the outset. In short, waste data is never 'especially great'. This poses challenges for those engaged in planning and forecasting, especially if the intention is to extrapolate based on past trends when the quality of data capture may be changing. The issue of data capture poses particular challenges in Ireland, as we shall see.

3.1 DATA AND REPORTING

In what follows, we concentrate on issues around household and commercial waste, as well as municipal waste. This is not to suggest that equally significant issues might not arise in the context of other waste streams.

It is worth making clear at the outset that the presentation of data is effectively the role of the Environmental Protection Agency (EPA). The data is not, however, collected by the EPA directly. The EPA relies upon data gathered from questionnaires sent to:

- Local authorities in respect of municipal waste collection / recycling data, and transfrontier shipments, including data acquired from private sector collectors as reported to the authorities (in Annual Environmental Reporting (AER) Forms);
- Organisations involved in recycling (in respect of quantities recycled);
- Private sector waste operators in respect of waste handled at different facilities;
- Private sector companies in respect of waste generated.

To a considerable degree, therefore, the quality of the available data is conditioned by the accuracy of the feedback from the different data providers. To this end, the EPA has sought to improve data collection from, for example, local authorities. However, it is worth recognising that in a given local authority area, gathering all the relevant data

concerning municipal waste could be a relatively resource intensive task, especially where there are many collection companies with permits.

3.1.1 HOUSEHOLD WASTE

Household waste is defined in the Waste Management Acts, 1996 and 2001, as 'waste produced within the curtilage of a building or self-contained part of a building used for the purposes of living accommodation.' Where household waste is concerned, not all households make use of a waste collection service, and nor are they required to. Consequently, data on waste collected from households suffers from the fact that some degree of estimation is required concerning quantities of waste generated by households who receive no collection. This is complicated by the fact that simply pro-rating total waste quantities on the basis of the number of households without collection is not an acceptable methodology because:

- Some households may be second homes / holiday homes, and therefore, not occupied all year round;
- Some households may avail themselves of other facilities, such as civic amenity sites, bring banks, landfills, etc., so they may be dealing with waste legally, but without resort to any collection system;
- Some households may share the use of bins;
- Some households may simply not be served by collections (as the costs of serving them are deemed too high for collectors to bear);
- Some households may be disposing of some or all of their waste through illegal means.

Some, but not all, of these methods will reduce the quantity of waste being collected through whatever route. For example, burning, or illegal burying of material, will effectively reduce the quantity reported through waste data capture mechanisms. On the other hand, to the extent that fly-tips are cleared up, and then enter the reporting system for waste, then this material does contribute to the tonnage of waste reported. It merely appears through a different 'route'.

The EPA produces data reports on an annual basis with more substantial reports appearing in alternate years. The data is, we understand, based upon information supplied by local authorities, who rely, in turn, upon data from the companies who hold waste collection permits.

In the National Waste Database Report 2001, the EPA based household data on information from local authorities including:

- 'the quantity of household waste generated, collected and managed (including landfill and recycling) in their functional areas, either by or on behalf of the local authority;
- the percentage of households that are served by a collection system.

*In local authority areas without 100% coverage by collection systems, total household waste arisings were calculated by extrapolating the reported quantity according to the reported proportion of households not served.'*⁶

In 2005, the approach was changed to enable better cross-checks to take place:

'The revised methodology is based on information obtained directly from:

- EPA-licensed municipal landfills – the data is checked by the Office of Environmental Enforcement as part of compliance auditing of landfill licences;
- Organisations engaged in waste recovery – data for 2004 was verified by the EPA by way of site visits to organisations responsible for 65% of the total reported quantity;
- Local authorities – including an estimate of uncollected household waste according to a standardised methodology used by all local authorities; street cleansing waste; and notified municipal waste exports not otherwise accounted for.'

It noted:

'The methodology used in previous years was based on information provided by local authorities, based in turn on reports from waste collection permit holders. There is however no evidence of verification exercises being undertaken by local authorities at the premises of waste collection permit holders. This was particularly highlighted during six EPA audits of construction and demolition waste data compiled by local authorities, during which it became clear that verification checks were not being carried out. Unverified data on waste cannot be relied upon. The one exception noted was Meath County Council, which commenced a verification programme in 2005.'

The fact that local authorities were not carrying out such inspections is, perhaps, not surprising. In some regions, there are a large number of permit

holders. One issue which local authorities in such areas would, presumably, have had to consider is the resourcing of the inspections being envisaged. It could be argued that collection permits ought to reflect the likely cost of inspections / auditing. However, the Waste Management (Collection Permit) Regulations 2001 effectively set flat fees for permits (currently, €1,200 or €380 where the collection is of waste oils only).⁸ It seems reasonable to argue that such a system of fees would not reflect the costs of auditing and inspecting the information supplied by those who hold permits. A possible alternative would be to fund inspections from the Environmental Fund.

The mechanism for estimating uncollected household waste has also changed over time. In 2003, the EPA reported that uncollected household waste was estimated at 287,294 tonnes of household waste, an increase of 15% from the estimated 248,768 tonnes in 2002, and around 18% of all household waste in 2003.⁹ It reported that 79% of households were being served by a collection service. In some local authority areas the proportion was reported to be as low as 45%, whilst in others, mainly city council areas, 100% of households were being provided with a collection service.

In 2004, the EPA adopted a different approach.

Each local authority was requested to provide an estimate of uncollected, or otherwise unaccounted for, household waste in 2004. A standard methodology for estimating this quantity was provided by the EPA, allowing local authorities to take local conditions into account. All local authorities used the recommended methodology, hence the estimate is consistent across the country. The national estimate of "uncollected" household waste is 227,374 tonnes, a decrease of more than 60,000 tonnes since 2003. The 2004 estimate is considered to be more robust as it was given more systematic consideration by local authorities. Local authorities also reported the clean-up of 11,192 tonnes of fly-tipped waste, accounting for 5% of "uncollected" household waste. Some of the uncollected household waste is undoubtedly subjected to backyard burning and the EPA's Office of Environmental Enforcement recently reported that 80% of local authorities claim to have a problem with backyard burning of waste in their functional area.

According to information provided by local authorities, the national average for provision of household waste collection service is 77%. It is recommended that local authorities take active steps to establish which of the above listed exemptions apply in relation to the 23% of households that are not provided.¹⁰

3.1.2 COMMERCIAL WASTE

The system of waste collection permits effectively allows different waste collection companies to compete for business in the area for which they hold a licence. The companies involved in collection may choose to collect from households and businesses. This means that distinguishing between household waste, commercial waste and industrial waste is unlikely to be straightforward.

At one level, this is not of concern. However, the definition of municipal waste used by Ireland is set out in the Waste Management Acts, 1996 and 2001, as 'household waste as well as commercial and other waste which, because of its nature or composition, is similar to household waste.' This definition implies that targets set for municipal waste require some delineation between that part of commercial waste which, because of its nature or composition, is similar to household waste, and that which is not. The judgment as to what makes such waste 'similar' or not is clearly a difficult one to make.

This is somewhat problematic as it raises issues concerning how Ireland could have confidence that it was complying (or not) with the requirements of Article 5 of the Landfill Directive, which requires Member States of the EU to divert progressively greater quantities of biodegradable municipal waste (BMW) from landfill. This is not strictly an Irish problem. One can reasonably question the sanity of devising a piece of legislation in such a way that it targets what, for most Member States, is a 'stream' of waste which is defined administratively, if at all.

This variation in the approach to defining municipal waste is well recognized by the EPA, which notes:

The European Environment Agency (EEA) has reported that Ireland ranks as the largest per capita generator of municipal waste in the EU. The EEA acknowledges however that data are in general not comparable and, in many countries, are based for the most part on household waste

and often exclude recycled wastes. In Ireland, by way of contrast, 40% of municipal waste generation in 2004 is comprised of commercial waste and 34% is comprised of recycled waste. It is clear therefore that many countries do not define municipal waste generation as broadly as in Ireland. The 2002 EU Waste Statistics Regulation is intended to harmonise EU-wide reporting on waste and it is anticipated that comparable results for 2004, from across the EU, will be available in 2006/7. It is interesting to note that the point of comparison for the Waste Statistics Regulation is household waste generation and this acknowledges the common experience that municipal waste data is not, in fact, comparable.¹¹

Notwithstanding this clear statement, the more recent report by Forfas seeks to make comparisons which the EPA – correctly, in our view – appears to regard as quite misleading:

*‘Some differences exist between the benchmark countries in their approach to recording municipal waste. In particular, the extent to which waste from commerce is included can vary. In some instances, the reported municipal waste figures mainly represent household waste, with only small quantities of commercial waste included. However, while every effort has been made to ensure that the data is as comparable as possible, there is still a need for caution when comparing municipal waste generation in Ireland with other countries due to the difference in definition.’*¹²

*The data caveats above notwithstanding, Ireland has the highest level of municipal waste generation with a figure of 777 kg per capita.’*¹²

These points aside, given the definition used, Ireland is where Ireland is. The wide definition used effectively implies that the task of meeting the targets set under Article 5 of the Landfill Directive Ireland is somewhat greater in absolute terms. As suggested above, this also presents an opportunity. Many other Member States regret their often relatively concentrated emphasis on household waste at the expense of commercial wastes (this has been true, until recently, even of some ‘lead countries’ such as Austria, as well as countries such as England, which is currently revising its waste strategy, with an increased emphasis on commercial and industrial waste issues expected). Equally, it requires policy levers around ‘more than

just’ household waste. In particular, it effectively requires an institutional framework that encourages a growing proportion of commercial wastes to be dealt with in the appropriate manner.

3.1.3 USE OF DATA IN NATIONAL POLICY DOCUMENTS

The earliest major policy document reviewed, ‘Waste Management: Changing our Ways’¹³ (henceforth, ‘Changing our Ways’) presents some data but the basis for the data included in the report is not clear. Hard figures are barely disclosed, with some mentions of the quantities of material going to landfill (2,000,000t in 1995¹⁴) and the proportions of waste going to landfill (84.7% of collected commercial and 95.7% of collected household waste). These cited proportions are referenced back to the EPA’s ‘National Waste Database Report 1996’. What is happening to the rest of the waste is not declared. This includes the fact that there is no discussion relating to the number of households with or without household waste collections.

This situation largely persisted into the 2002 policy document on ‘Preventing and Recycling Waste: Delivering Change’ (henceforth, Preventing Waste)¹⁵. The source of the limited data available throughout the documents is unclear, with citation of published documents rarely provided. Data sources appear to include the EPA, Repak (the national producer responsibility compliance scheme), and the EU. Again in 2004, whilst more information is presented (for example the number of households on separate collections of dry recyclables, bring bank and civic amenity (CA) site provision), the trend of somewhat limited waste data presentation and analysis continues.

Although ‘Changing Our Ways’ states that ‘planning for waste management starts with accurate data collection’ there is no guidance as to how this could be achieved and what is required. This is with the exception of composition analysis to which the reader of the document is referred to the EPA. The point is re-emphasised in the subsequent policy review to be issued by DOEHLG, ‘Managing Waste: Taking Stock & Moving Forward’ (henceforth, Taking Stock)¹⁶ which states that local and regional waste management plans must be based on the most up to date information.

In Preventing Waste, certain performance indicators are being requested from local government. It is

stated that as an absolute minimum these should relate to the provision of bring facilities. It is clear that this minimum is not sufficient to be able to develop a credible waste policy. However, though the document goes on to say that a National Waste Management Board will be asked to recommend how Plans should best be developed and extended, the National Waste Management Board was never established.

'Taking Stock' recognises that each region uses and reports different information and that there is a lack of consistency:

'Commonly, local authority waste management plans highlight, either directly or indirectly, the lack of consistent, reliable information on waste generation within the regions. Different approaches to data/statistics have been taken in the plans, with a variety of data estimation and presentation practices.'

To address this, it is suggested that the annual reports on implementation against the plans that local authorities are to prepare should include information on progress towards the waste related performance indicators as set out in *'Delivering Value For People – Service Indicators In Local Authorities'*¹⁷.

These service indicators include:

- % households with segregated waste collection;
- % household waste recycling;
- % household waste to landfill and numbers of recycling facilities.

However, as discussed above, since household and commercial waste are collected by many private operators, the accuracy with which the data can be split between household and commercial waste is limited.

In the National Biodegradable Waste Strategy (henceforth NBS),¹⁸ the split of municipal waste between commercial and household waste is discussed as if it is known with accuracy. Also, there is no appreciation of the difficulties in splitting out the commercial waste which is 'similar' to household waste from that which is not. The degree to which there is uncertainty within this area is not presented.

The presentation of background data is much more substantial within the biodegradable waste

strategy, with data references referring back mainly to the national waste database reports that are produced by the EPA. However, within the strategy itself, there is no detail as to how the quantity of Biodegradable Municipal Waste (BMW) is calculated. The projections are particularly worthy of note (see Section 3.2 below).

Information from the National Waste Database 2003 is used to present details of the quantities of biodegradable waste landfilled and recovered. However no composition of the waste is provided so it is difficult to see where this information (presented by material) comes from. Furthermore, the data for the diversion of kitchen and garden waste is not separated out – this being important especially given the likely impacts on arisings when doorstep collections are provided (depending upon how households are charged for this service).

3.1.4 SUMMARY

The 2006 Forfas study states that:

*'Ireland's waste statistics compare well with all 10 countries selected, both in terms of availability and the accuracy of the information available. This is largely due to the continuing improvement of the EPA's 'National Waste Database' reporting system, and to recent improvements in the standards of waste facilities and regulation of waste companies.'*¹⁹

The comprehensive reports provided by the EPA on an annual basis since 2003 (previously biannual) certainly provide a basis for moving forward, and the EPA seems determined to maintain continuous improvement in this area, whilst recognising, quite appropriately, some of the difficulties and constraints under which the reporting and capture of data is required to function. Amongst these is the fact that reporting on waste permits remains uneven.

In 2003, the EPA noted:

*'The availability and reliability of information on waste continues to improve. The waste collection permit regulations came into operation in November 2001 and it is likely that the increased quantities of some waste streams reported are as a result of ongoing improvements in compliance and reporting under these regulations.'*²⁰

Two related points are important: first, the reporting is improving; and second, the fact that reporting is improving over time may be leading to an overstatement of the degree to which waste generation is actually increasing (because some of the reported increase may simply reflect better reporting). This improved reporting in terms of coverage is probably also improving in its accuracy at the same time as more of the information being reported is based upon quantities recorded through weighing (either on vehicles or at weighbridges).

The evolution over time is summarised by EPA thus:

‘Waste data management has evolved significantly since the National Waste Database report series was commenced. The data increasingly revolves around waste treatment operators and the mapping of waste flows to and from waste recovery and disposal facilities. New proposals designed to combine waste reporting with waste enforcement are in train and will be further developed in 2006. Waste data provides the foundation for waste management planning and allows progress to be quantified and reported upon. Waste data is scrutinised and queried at ever increasing levels of detail and the data should therefore be credible and supported by audits and other verification exercises. The continued development of waste information management systems at local and national levels should be actively supported and allowed to evolve into the future.’²¹ (our emphasis)

In general, therefore, one would argue that the use of past data needs to be treated with some care. This makes the issue of how projections are made, and what use is made of them, one of considerable significance.

Looking forward, there remains a question as to how waste data can be made still more reliable in the future. One possibility would be to ensure that the auditing of that data which is gathered is collated and examined thoroughly. It seems less than clear that the local authorities should be effectively auditing their data, as well as that of others.²²

3.2 GROWTH RATES / PROJECTIONS

In the context of the development of waste plans, and with regard to the potential for meeting specific targets, the growth rate of different waste streams is critical for reasons associated with:

- Cost;
- Projections for future quantities / understanding potential impacts of initiatives;
- Understanding the desired evolution in capacity for treatment facilities, whilst seeking to retain flexibility within an overall strategy.

This section reviews the way in which growth rates have been estimated both at the national level and the regional level. We then seek to undertake some reconciliation across the national and regional growth rates.

3.2.1 NATIONAL LEVEL

In the majority of public policy documents, there is little real attempt to understand what lies behind the growth in quantities of waste. The National Review of Waste Management Plans makes such an attempt to forecast, but there is no attempt to ‘backcast’ (i.e. to understand what has already happened). A key question for Ireland, in seeking to understand the future, would appear to be an understanding of what has happened in the past. For example, to what extent does the reported waste growth appear to be ‘genuine’, and to what extent is it a consequence of improved reporting of data? What has been, and (therefore) what may yet be, the impact of pay-by-use systems? What (if any) relationship is there between economic growth and waste arisings? How has population growth influenced waste arisings?

There is very little discussion of waste growth rates within early policy documents. In *Changing our Ways* the only significant reference to growth rates is in section 4.1 where it states that ‘a major general objective is to stabilise, and in the longer term reverse, the growth in waste generation’. No numeric assessment of growth rates, past or projected is provided. This is perhaps understandable given some of the limitations in the data already described.

This relative absence of analysis is not rectified in *Preventing Waste*, in which there are two main references to waste growth:

- the first states that MSW has doubled over the past 14 years (to 2002);
- the second relates waste growth in Ireland to EU growth of almost 10% between 1990 and 1995.²³

There is no attempt to conduct any more detailed analysis on waste growth or show where these

figures were derived from. There is no presentation of likely population or household growth, both of which are likely to be important in understanding waste growth.

Information on growth rates is limited within Taking Stock. In relation to the Regional Waste Management Plans (RWMPs), it states that:²⁴

'As with the baseline data in plans, the data in relation to projected waste arisings was also characterised by a variety of approaches. Projections were presented in some plans in absolute terms while, in others, the future scenario was expressed in terms of percentage rates of increase over a particular base year. The extent of the future horizon of plans is also quite varied, ranging from 2004 up to 2013.'

This variety of approaches is taken up further below. No detailed analysis of the individual waste streams, or sub-streams within those, is undertaken. For example:²⁵

'plans that based forecasts solely on anticipated economic growth or population increase predicted continued steady growth in the quantities of waste generated each year. Where other factors were taken into account – such as socio-economic indicators, trends in waste management and international experience – somewhat different

conclusions were drawn. In overall summary terms, the future orientation of the waste management plans was based on –

- *increases of between 1 and 3 percent per annum in per-capita household waste generation in the short-term, with slower increases or a levelling off in the longer term;*
- *continued, but slowing growth in commercial waste generation over the projection period;*
- *a levelling off, or potential decline, in industrial waste generation.'*

Perhaps most concerning is the fact that in order to calculate future municipal waste arisings, the data (which previously was acknowledged as being collated differently) has been added together to give a national projection of 2.6 million tonnes per annum for the medium term (no indication is given of the horizon for the medium term). This is less than the 2001 total municipal waste figure of 2.7 million tonnes as highlighted in Table 1 below. This point is recognized in the text and is used to further the call for better data.²⁶

'it is important that waste management plans are as up to date as possible and that their projections for future waste arisings are framed on the basis of an appropriate combination of ambition and realism'

TABLE 1: MUNICIPAL WASTE DATA

	1995	Waste Management Plans Base Year	1998	2001	Waste Management Plans Medium-term Objectives
Household	1,324,521	1,291,644	1,220,856	1,468,834	
Commercial	476,920	724,635	754,797	1,156,732	
Street Cleansing	46,791	50,000 (est)	80,999	78,469	
Total	1,848,232	2,066,279	2,056,652	2,704,035	2,600,000

Source: DOEHLG (2004) Managing Waste: Taking Stock & Moving Forward. April 2004.



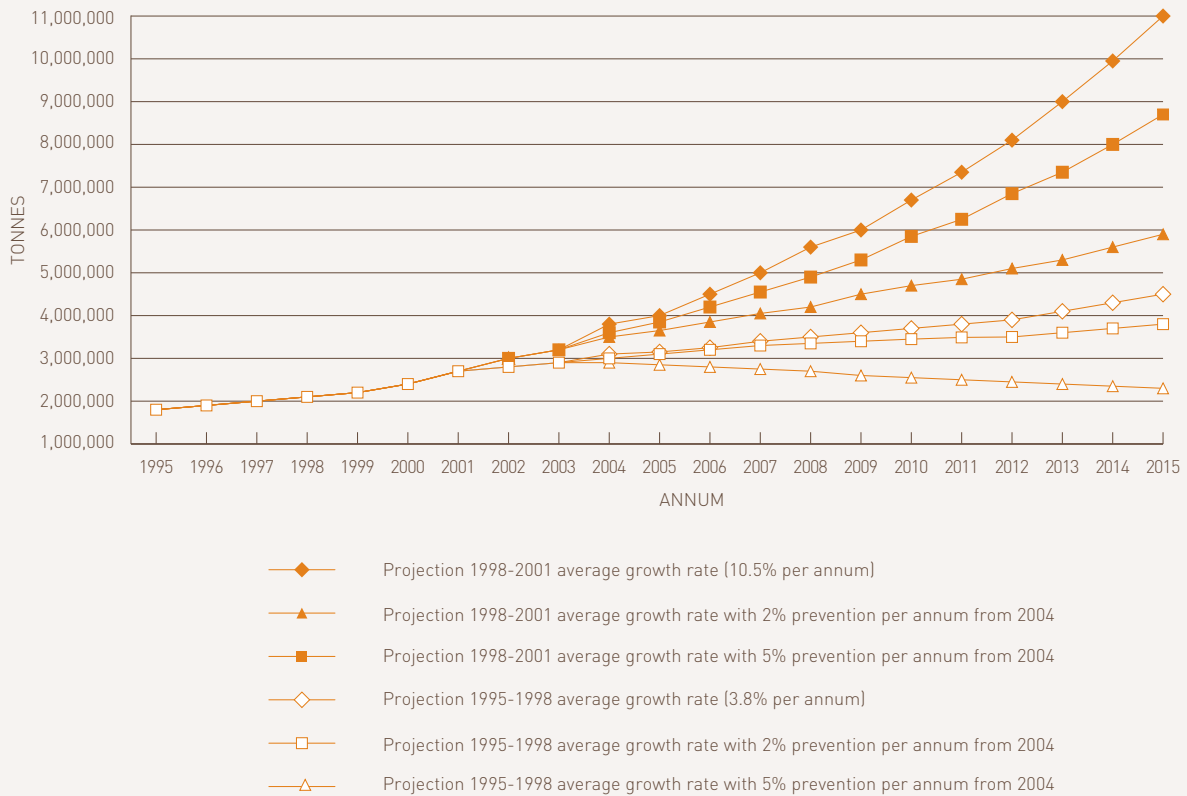
The report goes on to recommend:
'In the context of projections of possible future waste arisings, local authorities should have regard to the possible scenarios identified by the EPA in the National Waste Database Report 2001.'

At first sight, this might appear to be restrictive. In reality, however, the scenarios referred to in the EPA National Waste Database Report 2001 are hardly definitive, and they might even leave local authorities scratching their heads as to which scenario they

should run with – the one positing a slight decline in waste over 14 years (2001-2015), or the one implying a near-quadrupling of waste over the same period (or any of the five others in between)? (The projections are shown in Figure 1 below).

The report recognises that a key aim of the Core Waste Prevention Team within the EPA *'will be to improve data on waste arisings so that a sound basis for the measurement and monitoring of the Programme's impact can be established.'*

FIGURE 1: GENERATION OF MUNICIPAL WASTE (PROJECTED TO 2015, TONNES)



Source: EPA (2003) National Waste Database Report 2001.



3.2.1.1 DRAFT AND FINAL BIODEGRADABLE WASTE STRATEGY

The Draft Biodegradable Waste Strategy, and the Final version, contain more information than any other policy document to date on waste growth rates and projected figures. However, there are a number of difficulties with respect to the rationale and reasoning behind historic and future growth projections. In addition, the change in tone and substance between the Draft and the Final Strategy are, as we shall see, enormous.

The draft strategy, published in 2004, applied an annual growth rate of 3.8% to the arisings of biodegradable municipal waste. This was the growth rate experienced from 1995-1998 as reported in the EPA Report of 2001. The logic was presented as follows:

*'A waste growth rate of 3.8% per annum has been applied for the period of the Strategy. This is the growth rate that was experienced in the period 1995-1998. While economic growth and population growth may moderate in the coming years, choosing a relatively high growth rate such as this means the strategy should prescribe adequate waste recovery capacity and in any case there will be no difficulty if the landfill diversion targets are ultimately exceeded.'*²⁷ (our emphasis)

Needless to say, the potential providers of that capacity may take a different view if planners award consents for capacity far in excess of what it transpires is required.²⁸

No adjustment is made to the projected growth rate to allow for the impact of waste prevention activities. It is stated that:

*'figures record that biodegradable municipal waste generation has increased by about 50% in that 9-year period [1995-2004], with 1.935 million tonnes generated in 2004.'*²⁹

The reasons given for this include population and economic growth together with better data collection and reporting. It does not account for changes in the numbers of businesses/households having their waste collected such that it falls under the definition of municipal waste, nor does it include any increases (garden waste in particular) relating to collection services being offered.

The Final NBS discusses, in Section 3.2, waste growth rates. Although the approach taken seems far from transparent, growth rates appear to have been based on work undertaken in 2004 (apparently, at the same time as the Draft Strategy was being developed).³⁰ That work essentially uses three factors to estimate growth in household waste, and then applies, on top of these, a waste reduction factor which reduces the derived growth rate accordingly. The three factors are:

- a) Population growth;
- b) A factor relating to the average reduction in household size over time;
- c) Growth in GNP.

The first of these is simply based upon expected rates of growth. The second is somewhat problematic in that expected average household size is calculated from two different datasets which generate rates of reduction in household size which seem very swift. These, in turn, are used to derive a factor for the growth in household waste using evidence from one study, and this leads to quite high annual rates of growth resulting from this factor alone. Finally, the third factor effectively implies an element of double counting. Given that the modelling already accounts for increases in population, and given also that GNP figures are affected by the economic activity of the total population, the population effect appears to have been 'double counted' (if a relation to GNP was to be considered, it would have been more appropriate to specify this in per capita terms given that population was already being accounted for). The waste prevention factors were applied as follows (and were attributed to the National Waste Prevention Programme), being essentially a reduction in the trend in arisings developed from the growth factors discussed above:

- | | |
|----------------|----|
| • 2002 to 2003 | 0% |
| • 2004 to 2005 | 2% |
| • 2006 | 3% |
| • 2007 to 2010 | 5% |

In relation to historical growth rates the Final NBS states that:

'there have been anecdotal reports of appreciable reductions in the amount of waste presented since the introduction of the 'Pay-by-Use' (PBU) system on 1st January 2005.'

It does not attempt to quantify these, nor make any statement saying how much of this is due to increased deliveries to civic amenity sites, or direct to landfills, or through illegal dumping, or through genuine waste prevention.

As regards future waste arisings, the EPA-led National Waste Prevention Programme now underway is forecast, in the Final NBS, to have a significant impact on waste generation in future years:

'a waste reduction factor of 3% is being applied for the year 2005, rising progressively to a level of 6% by the year 2016.'

As a consequence of the waste reduction factor, BMW arisings are expected to increase at a declining rate until 2012 after which the absolute quantity is expected to decline. Section 6.3.7 on targets states that

'The projections of biodegradable municipal waste generation in future years in the Strategy are based on an expectation that these waste prevention initiatives will yield dividends in reducing the quantity of BMW which would be generated in their absence.'

The resulting reductions in BMW are forecast as follows:

- *period 2005 to 2007: 3% reduction factor in each year,*
- *period 2008 to 2010: 4% reduction factor in each year,*
- *period 2011 to 2013: 5% reduction factor in each year,*
- *period 2014 to 2016: 6% reduction factor in each year.'*

We discussed with the EPA whether any analysis of the likely impact of the National Waste Prevention Programme had ever been undertaken and it seems clear that it has not. Indeed, there appears to be no reasoned justification for the assumptions being made. Representatives of the EPA were aware, however, that the burden of first slowing, then reversing, the growth of BMW in future was falling fairly and squarely on the shoulders of their National Waste Prevention Programme.

The difference in the projections, and the underlying philosophy, between the 2004 Draft Strategy and the Final NBS could not be more stark. The projections from the two documents for biodegradable municipal waste are shown in Figure 2 and Figure 3 overleaf. Essentially, one sees a transformation from a position where waste was forecast to grow exponentially to one where waste first grows, but then declines. The 3.8% per annum figure disappears from the Final NBS, and there is no clear explanation as to how the projection in the Final NBS is actually derived. It seems reasonable to ask how such a dramatic change in perspective could have occurred in the two years separating the Draft and Final NBS.

FIGURE 2: PROJECTIONS OF MUNICIPAL, AND BIODEGRADABLE MUNICIPAL WASTE, DRAFT NATIONAL BIODEGRADABLE WASTE STRATEGY

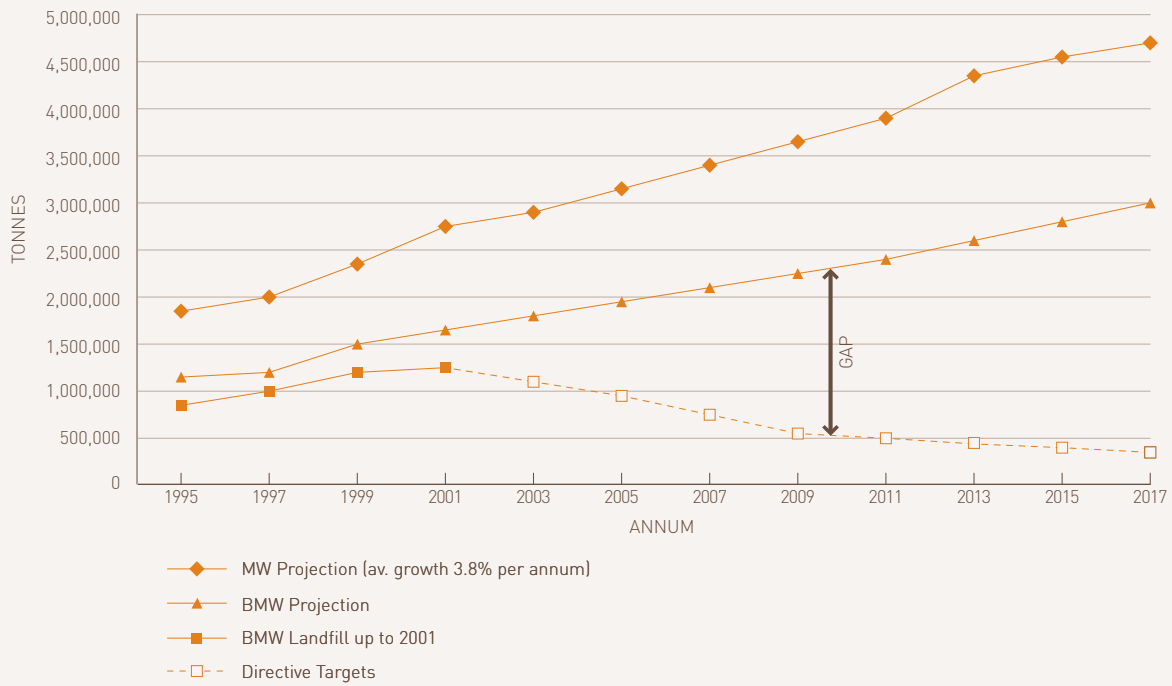
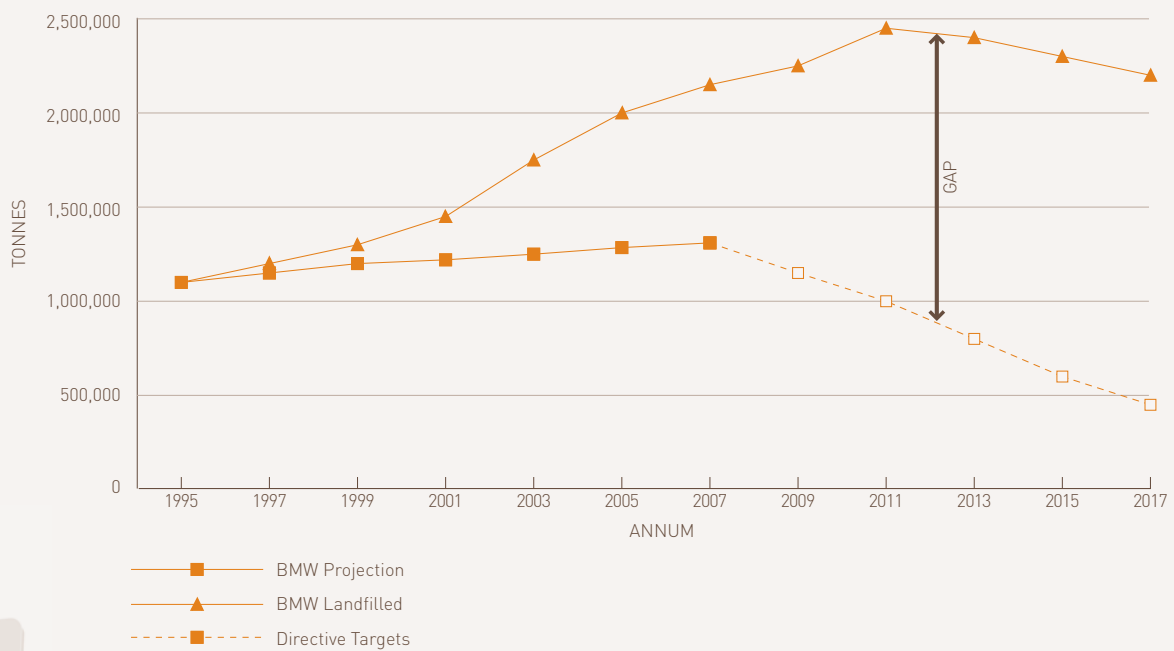


FIGURE 3: PROJECTIONS OF MUNICIPAL, AND BIODEGRADABLE MUNICIPAL WASTE, FINAL NBS



It also seems reasonable to ask whether one can read much into the projections given the obviously shaky basis upon which they are founded. This undermines the credibility of the NBS since, as the Figures indicate, the 'gap analysis' (illustrating what Ireland has to achieve under the Landfill Directive targets) has, for the year 2016, changed from dealing with 2.6 million tonnes of BMW in the Draft Strategy to dealing with 1.8 million tonnes in the Final NBS. The Final NBS notes:

'The extent of biodegradable municipal waste generation is fundamental to the ability of Ireland to comply with the landfill diversion targets. It is therefore imperative that data on BMW generation is kept under continuous surveillance and review. The Strategy must be refined as a matter of urgency through the implementation of appropriate measures should BMW generation projections be found to deviate from the anticipated levels.'

Even this strongly worded statement looks like an understatement given that the projections in two documents – separated by two years – differ by such a substantial margin.

3.2.2 REGIONAL WASTE MANAGEMENT PLANS

We have reviewed the latest version of the RWMPs to seek to understand their approach to projecting forward from current positions. There is a variety of approaches taken to the projecting forward of waste management quantities.

All areas have arisings increasing in the future, with no period being anticipated in which waste quantities begin to fall. Consequently, the projections in the RWMPs should be expected to deviate fairly significantly from those implied by the NBS.

What has surprised us, in particular, has been the lack of analysis undertaken in the new RWMPs on what has happened since the previous RWMP. There is very little by way of any attempt to try to understand the past, still less, as a means of trying to understand the future.

What we have done, on the basis of a review of RWMPs, is to compile waste projections as presented in the RWMPs in order to compare to national waste projections in other documents. Full tonnage projections up to 2020 are provided in many

of the RWMPs and annual growth rates are given in several others. Where projections were only made to 2010, the annual arisings increase in the last year was carried forward through to 2020. In some RWMPs data points had to be approximated from low resolution charts.

The compiled regional data for total municipal waste (household plus commercial plus cleansing waste) increases from 2,937,000 to approximately 4,260,000 tonnes between 2004 and 2020.

The National Waste Database data can also be projected at a selected national growth rate. The 1995-98 average growth rate of 3.8% may be a high figure based on a very limited number of data points but it has the merit of greater realism than the 1998-2001 average of 10.5%. The 3.8% figure leads to a total municipal waste figure of over 5,500,000 tonnes for 2020. This does not, however, incorporate any waste minimisation which has, to some degree, been incorporated in the RWMP data.

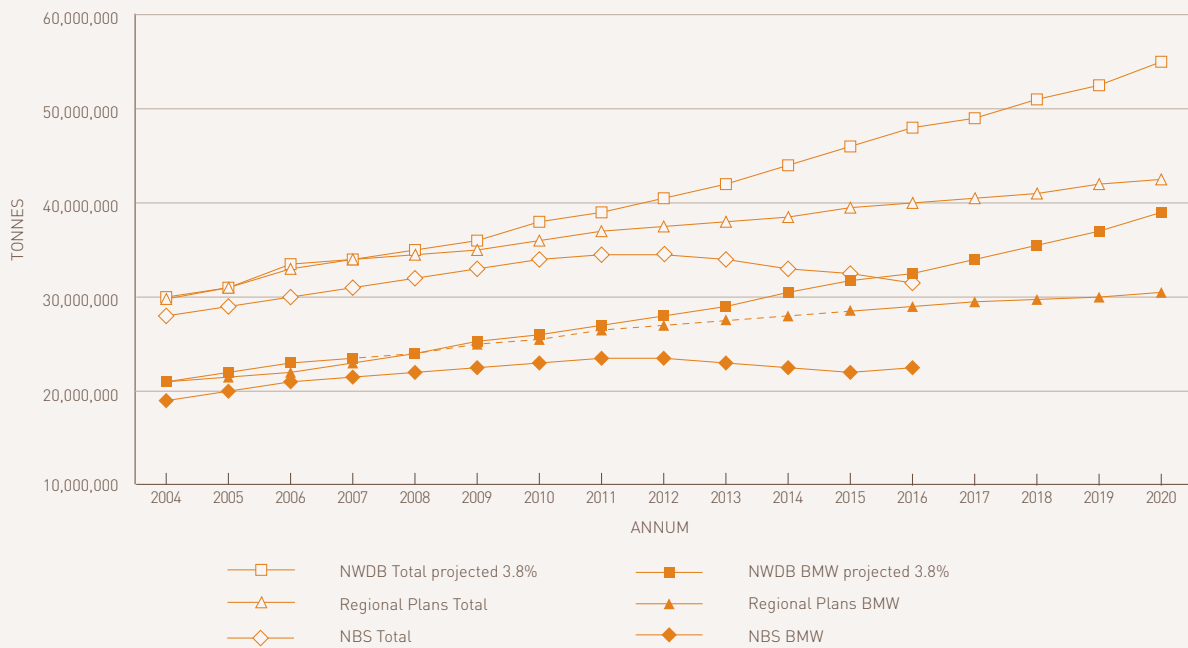
The waste compositions for household, commercial and overall municipal waste in the EPA characterisation work (EPA/RPS, December 2005, 'Programme for Municipal Waste Characterisation Surveys', Final Report) can be used to give a figure for biodegradable content. Assuming that, of the categories listed, organic, paper, cardboard, textiles and wood are biodegradable, and that other categories are not, Table 6.31 on page 127 leads to 66.6% of household waste being biodegradable, 77.4% of commercial, or 70.0% of overall municipal. This can be used to assess the biowaste content of the above two projections.

The final projection of interest is that which is presented in the NBS, the projection which includes significant waste prevention. Although it only gives a projection for biodegradable waste, for our purposes this can be extrapolated to total municipal waste using the 70% biodegradable figure.

The data from all three sources is shown in Figure 4 below. It shows, rather obviously, how disparate the projections are at the regional and national level. It is theoretically possible to imagine that the RWMP data and that in the NBS are consistent if one imagines that the effect of the National Waste Prevention Programme is to effectively prevent the generation of BMW, whilst at the same time, the

generation of all other wastes accelerates. The possibility is barely worth considering, however, since it is highly unlikely.

FIGURE 4: BIODEGRADABLE AND TOTAL MUNICIPAL WASTE PROJECTION COMPARISONS



Sources include Regional Plans, NBS and Draft NBS

Notes: NBS = National Biodegradable Waste Strategy, NWDB = National Waste Database, BMW = Biodegradable municipal waste

3.2.3 SUMMARY

As the above analysis shows, waste projections have not been handled with great care in Ireland. Projections are important for all sorts of reasons. The disparate projections of the RWMPs, the NBS and the EPA (albeit back in 2003) were highly suggestive of the fact that no one really had a well-developed understanding of the likely rate of waste growth in future years. Part of the problem, we suspect, lies in the fact that no one seemed to have 'looked back' to understand why the historic evolution in waste quantities appears as it does. What was the cause of past growth? Which streams grew fastest? To what extent could better reporting help explain growth?

It might be pointed out, with regard to the existing RWMPs, that they have tended to reflect the guidance in the Waste Management (Planning) Regulations 1997.³¹ Part 2 devotes considerable attention to the need to outline the present position in waste management. Part 3 is much more brief and is set out below:

'Anticipated developments over the period of the Plan

For the purposes of paragraphs (c) to (e) of section 22 (7) of the Act, a plan shall provide an assessment of likely trends or developments which may be expected to have an impact on the quantities and type of wastes arising, the need for waste recovery/disposal facilities, or other aspects of waste management, and this assessment shall include—

- *the effect of measures to prevent or minimise waste production or the harmfulness of waste*
- *trends in population distribution and activity in the commercial, industrial and agricultural sectors*
- *trends in waste management, including private sector involvement in waste collection, recovery and disposal*
- *pending Community acts in relation to waste management and environmental standards*
- *relevant developments in the functional areas of other local authorities or, where appropriate, in other Member States*

Where appropriate and feasible, possible alternative scenarios should be described.'

There is relatively little emphasis placed upon the interrogation of data to elicit trends, or to understand the quality of data. The RWMPs tend to reflect this Guidance – they are long on the presentation of data, and rather short on the analysis of it.

Without closer exploration of these issues, preferably at the local / regional level (since national data will 'average out' local variations), it is difficult to see how forward projections can be made with any authority. Existing projections lack authority, and are compromised by the enormous gulf between Draft and Final NBS's, the advice from Government that regard be had to the enormously varied EPA projections made in 2003 (which provide no meaningful guidance – probably, they did not set out to), and the varied approaches of the RWMPs.

To the extent that data has been – by the admission of all concerned – less than perfect, it seems reasonable to question the validity of data forwarded to EUROSTAT for the purposes of benchmarking the quantity of Ireland's BMW in 1995. This figure is, of course, important in that it is the basis for measuring whether or not Ireland meets Landfill Directive targets henceforth.

This discussion raises more fundamental questions as to 'who is best qualified to make what projections?' This question needs to be considered, not least since it seems worth seeking to avoid creating national projections which differ so markedly from local ones. There is a general rule here:

- Where it makes sense for data projections to be made locally, they should be made locally and aggregated up to the regional / national level as appropriate;
- Where it makes sense for data projections to be made regionally, they should be made at that level and aggregated up to the national level / apportioned down to the local level as appropriate;
- Where it makes sense for data projections to be made nationally, they should be made at that level and apportioned down to the regional / local level as appropriate.

Problems inevitably arise where different bodies make different forecasts using different assumptions.

Where national policy documents and RWMPs are making forward projections (as indeed they should), far greater care needs to be taken in making such projections. As far as possible, projections should be made at that level of government with the greatest influence over the waste stream concerned. Some appropriate Guidance could be given in updated Waste Management (Planning) Regulations.

3.3 TARGETS

3.3.1 NATIONAL TARGETS

The setting of targets – whatever the issue being considered – always has implications for the balance of costs and benefits associated with their being met. Invariably, this leads to questions as to how those targets should be set, and in particular, what factors should determine the appropriate balance of those costs and benefits.

The key targets at the national level in Ireland are found essentially in two documents:

- Changing Our Ways – this document contains the key targets for Irish waste management;
- The NBS – this outlines the 'gap' which must be closed if Ireland is to meet Landfill Directive targets. However, it is acknowledged that this 'gap' may change as projections change. The 'gap' is derived from the Landfill Directive Article 5 targets and the projections for waste growth.

Changing Our Ways set out the following quantitative targets, to be achieved over a 15-year period (i.e. to 2013):

1. a diversion of 50% of overall household waste away from landfill,
2. a minimum 65% reduction in biodegradable wastes consigned to landfill,
3. the development of waste recovery facilities employing environmentally beneficial technologies, as an alternative to landfill, including the development of composting and other feasible biological treatment facilities capable of treating up to 300,000 tonnes of biodegradable waste per annum,
4. recycling of 35% of municipal waste,
5. recycling at least 50% of C&D waste within a five year period, with a progressive increase to at least 85% over fifteen years,
6. rationalisation of municipal waste landfills, with progressive and sustained reductions in numbers, leading to an integrated network of some 20 state-of-the-art facilities incorporating energy recovery and high standards of environmental protection,
7. an 80% reduction in methane emissions from landfill, which will make a useful contribution to meeting Ireland's international obligations.

With the exception of target 2 (diversion of BMW from landfill, driven by the Landfill Directive), there does not appear to be any supporting rationale or evidence provided to justify the choice of these particular targets. DOEHLG representatives have argued that the rationale followed from European targets. But European legislation is not as prescriptive as the targets imply, and where it does establish targets, these are usually *minimum* targets.

These targets remain unchanged in "Preventing Waste". In addition there is a stated aim of recovering 50% of packaging waste by 2005 (which follows from the Packaging Directive). The policies described within the 2002 document to help to achieve targets are not supported by any quantitative information as to the likely impact that the schemes will make, nor is progress towards them stated in any meaningful way.

Taking Stock takes the view: ³²

'The materials recycling target of 35% for municipal waste will be particularly challenging. Nevertheless, although ambitious, it is considered

that the targets are achievable, particularly taking account of the fact that the most recent National Waste Database Report (for the year 2001), although showing progress on many fronts (including an increase from 9% to 13% in the recovery rate for municipal waste), does not reflect the impact of the implementation of local authority waste management plans which only began in a substantive way in late 2001.' (our emphasis)

It is somewhat ironic that the target was seen as so challenging given that nine years still remained for it to be achieved. Indeed, precisely because Ireland's definition of municipal waste includes commercial waste, the target is made somewhat easier than it would be in countries where the definition of municipal waste is more aligned with household waste given that much commercial waste arises in relatively clean streams of material (notably paper and card). Judged against wider European standards, the target would not be challenging even if it were applied to household waste only.

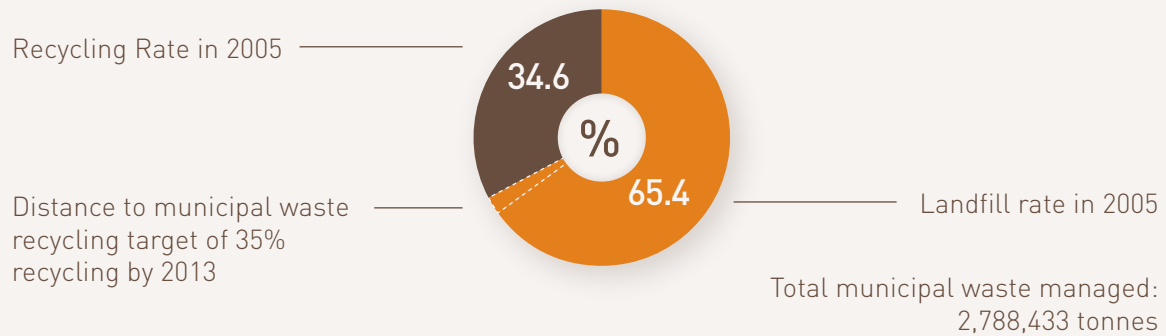
As much is more or less confirmed by more recent data. Notwithstanding some of the problems already highlighted concerning the data, Figure 5, from the EPA, shows that by 2005, the target was more or less already being achieved.

The issue here appears to be that because the targets which have been set have not been given the consideration they merit, it is not entirely clear to policy-makers which targets are challenging and which are not. Consequently, there appears to be a reluctance to change the existing targets, possibly because there was no underlying rationale which can reasonably be challenged, either through the weight of empirical evidence or through appeal to strategic concerns / intellectual rigour / changes in circumstance, etc



FIGURE 5: MUNICIPAL WASTE RECYCLING RATE

be as high, and probably higher, than that from



Source: EPA (2006) National Waste Database Report 2005.

3.3.2 REGIONAL TARGETS

The RWMPs have also set targets. It has not been possible to examine the rationale for all of these since the RWMPs we have reviewed are, in the main, revised versions of previous documents which may have contained such a justification. However, it is illuminating to explore the different approaches adopted thus far in the latest version of the RWMPs. The targets are set out in Table 2 overleaf.

households. In the Limerick, Clare and Kerry region, the initial plan had a target for recycling of household and commercial waste of 37.1%, and for industrial waste, of 41%. Commercial and industrial waste recycling had reportedly reached 59% by 2004³³. Household waste recycling was 13.9% in the same year.

What is most interesting is the logic underpinning the setting of the different targets. For example, in Dublin and the Midlands, one finds targets for household waste recycling which are far higher than those for commercial waste. On the other hand, the opposite is the case in the South East. It seems as though one set of consultants – RPS – takes one view (that targets for household waste recycling should be set higher), whilst another set – Fehily Timoney – takes the opposite view. Which is likely to be more correct?

Already, one is beginning to see the question answered empirically. In the Midlands, for example, the recycling rate for commercial and industrial waste was already 36% at the time the RWMP was written, whilst the household recycling rate was well below the target. Given that less than 70% of households are availing themselves of collection services, a 40% target will be challenging, though far from unachievable. It seems reasonable to argue that commercial waste recycling has the potential to



TABLE 2: TARGETS IN RWMPs

Region	Waste Stream	Recycling	Recovery	Disposal
Connaught	All	48%	33%	19%
Cork ³⁴	Municipal	35%		50% (hhld)
South East	Hhld	36%		
	C&I	50%		
Clare/Kerry/Limerick	Household / commercial	45%	41%	14%
	Industry	33%	26.8%	40.2%
	Construction / Demolition	80%	0%	20%
North East	Municipal	43%		18%
	All		39%	
Midlands	Household	40%	58%	2%
	C&I	26%	30%	44%
	C&D	80%	0%	20%
	Total (weighted)	46%	37%	17%
Donegal	Household	47%		
Dublin	Households	60%	39%	1%
	Commerce/Industry	41%	37%	22%
	Construction/Demolition	82%	0%	18%
	Total	59%	25%	16%
Kildare	MSW	35%		
	C&D	85%		
Wicklow	Municipal	35%		

Source: Various RWMPs

The variation in the level at which targets are set is also noticeable. For household waste, recycling targets vary from 36% in the South East to 60% in Dublin. Differing rates are generally acceptable, but the weight of empirical evidence from elsewhere suggests that rural areas are more likely to be able to achieve high recycling rates than urban areas. The suggestion is, therefore, that the South East is far more likely to achieve a high recycling rate than Dublin. This is not to say that, over the time being considered for Dublin to achieve 60% recycling, this could not be achieved. Rather, it is merely to point out the variation in the outcomes of the target setting processes, and the lack of a clear rationale for their level. Commercial and industrial waste

recycling rates vary from 26% to 50%. These are low rates, and arguably, they should be both higher, and more even across regions.

The latest Wicklow waste plan has lowered its recycling target aspirations to 35% of municipal waste. The original document is no longer available although the National Overview of Waste Management Plans stated a targets of 43% recycling for County Wicklow by 2013.

The most challenging targets in the list are:

- Household recycling rate of 60% in Dublin (which sits oddly alongside a far lower rate for commercial and industrial waste recycling);

- The 1% landfill rate for household waste in Dublin;
- Any target involving incineration (because of the lack of any clearly legitimate case for guaranteeing waste flowing to the facility in the existing collection market).

Few of the RWMPs took the opportunity to revise their targets in their second iteration (an exception was Clare / Kerry / Limerick). It is clear from the latest RWMP for Dublin that there are reservations about the nature of the targets as they were set, but no changes were made.

The consultants involved in writing most of the RWMPs, RPS MCOS, commented on the Cork strategy (which they themselves did not write) in evidence for Indaver Ireland:³⁵

'The proposed Waste Management Plan effectively continues the approach of the 'Waste Management Strategy for the Cork Region' developed of which commenced in 1995. This Waste Management Strategy was developed prior to adoption of EU Landfill Directive, and in the intervening 9 years several changes have come about, including:

- *unparalleled economic growth in Ireland, leading to dramatic waste growth*
- *advances in waste management technologies and international experience*
- *rapid increase in waste disposal charges, leading to high waste collection charges*
- *positive Irish success stories in waste separation and recycling of municipal waste*

Options that were attractive and sensible in 1995 may now be less relevant, and other options not available at the time are now more realistic.'

The message seems to be that given the nature of the changes which have occurred, revision of targets, rather than defence of ones set in earlier years, might be appropriate. This seems to be appropriate advice for the revised RWMPs more generally, as well as national strategy documents.

3.3.3 SUMMARY

Questions remaining to be answered include:

- What could be achieved through waste recycling in:
 - o Households;
 - o Commerce;
 - o Industry;

- What could be achieved through home composting, particularly if charging systems are judiciously applied to separate collections for biowaste;
- How can byelaws and other local authority powers (for example, the issuing of Waste Collection Permits) be best deployed to maximise the level of recycling in the country?
- Are '3-bin' schemes necessarily the best approach for implementation in Ireland (very few areas seem to seriously ask the question)?

In the absence of serious discussion around optimisation of collection strategies, and how this might be achieved, target setting is likely to be somewhat random and rather poorly informed.

Why is this important? We have looked at the approach to both:

- making projections;
- setting of targets.

The projections, in terms of waste quantities, ought to be made more carefully, and should consider the nature of collection systems being introduced. There is plenty of evidence to show that the nature and design of collection systems, especially for households, influences (or can influence) the quantity of waste generated. The same is true of charging structures for waste collection.

The aspiration to capture materials for recycling, and to do so progressively over time, is likely to find expression in the setting of targets. The projected quantities, net of the amount which is being targeted for recycling, ought to influence projections for the *maximum* quantity of residual waste which is expected to be generated in a given area at a given time. The italicised term 'maximum' is important here. The way to meet a target is not to plan to 'just meet' it. Targets are rarely met unless one sets out to exceed them.

The current approach combines a somewhat random approach to target setting with a limited basis for making forward projections of arisings. This does not give a sound basis for estimating likely quantities of residual waste arising in future years.

All of this has significant implications for the planning for residual waste treatment capacity. This issue is examined more closely in Section 6.0.

4.0 THE LANDFILL DIRECTIVE TARGETS IN IRELAND

For many Member States of the EU, the Landfill Directive targets are one of the dominant drivers, if not the dominant driver, of change in waste management. This is especially true in those countries such as the UK and Ireland where the management of waste has historically been based around landfilling.

Article 5 of the EU Landfill Directive 1999/31/EC sets out the targets for diversion of biodegradable municipal waste (BMW) from landfill as follows:

- no later than 16th July 2006, biodegradable municipal waste going to landfills must be reduced to 75% of the total amount (by weight) of biodegradable municipal waste produced in 1995;
- no later than 16th July 2009, biodegradable municipal waste going to landfills must be reduced to 50% of the total amount (by weight) of biodegradable municipal waste produced in 1995;
- no later than 16th July 2016, biodegradable municipal waste going to landfills must be reduced to 35% of the total amount (by weight) of biodegradable municipal waste produced in 1995.

However, Member States which consigned more than 80% of collected municipal waste to landfill are allowed to postpone the attainment of these targets by a period not exceeding four years. Ireland is entitled to take up this derogation and has indicated

that it will do so for at least the first two targets, and possibly, for the third also.

The challenge facing Ireland is a significant one (see Table 3). The NBS suggests that an increasing amount of BMW has been recovered over time. It notes, however, that:

'The improvement in recycling, while impressive, has not been adequate to substantially reduce the reliance on waste disposal, due to waste growth since 1995 – although the quantity of biodegradable municipal waste (BMW) being landfilled has now stabilized and has begun to decline since 2002.'

In other words, despite recovery of BMW almost trebling between 2001 and 2004, landfilled BMW increased in 2002, and has fallen only marginally since then. Most of the recovery is of paper and cardboard (see Table 4). This accounted for 60% of BMW recovered in 2004.

Table 4 also highlights the fact that the largest sub-stream which remains relatively poorly targeted is organic wastes. It is quite clear that targeted collection of organic wastes would have a role to play in meeting Landfill Directive targets given the estimated magnitude of the stream and the low capture rate at present.

The gap to the Landfill Directive targets was calculated in the NBS. The gap analysis –

TABLE 3: BMW GENERATION AND MANAGEMENT 1995 TO 2004

Year	Gross Quantity Available	Landfill	Recovered	Rate
1995	1,289,911	1,147,320	142,591	11.1%
2001	1,525,315	1,291,464	233,852	15.3%
2002	1,727,490	1,365,628	361,862	20.9%
2003	1,855,505	1,317,560	537,944	29.0%
2004	1,935,214	1,304,426	630,788	32.6%

Source: DOEHLG (2006) National Biodegradable Waste Strategy. April 2006.

TABLE 4: RECOVERY OF BMW FRACTIONS IN IRELAND, 2004

Material	Gross Quantity (tonnes) Available	Landfill	Recovered	Recovery Rate	Proportion of Total BMW Recovered
Paper/Cardboard	821,903	446,306	375,597	45.70%	60%
Textiles	157,521	146,986	10,535	6.70%	2%
Organic Waste	780,460	696,955	83,505	10.70%	13%
Wood	175,330	14,180	161,150	91.90%	26%
Total	1,935,214	1,304,426	630,788	32.60%	100%

Source: DOEHLG (2006) National Biodegradable Waste Strategy. April 2006 and our calculations

representing the requirement to deal with BMW in ways other than landfilling material untreated – is shown in Table 5, alongside estimates based upon different compounded growth rates for BMW over the period. In the NBS scenarios, the increase in the requirement to deal with BMW in ways other than landfill changes from 124% of total 2004 recovery capacity in 2010 to 174% of total 2004 capacity in 2013 and 188% of total 2004 capacity in 2016.

Our calculations suggest that:

- a) using NBS growth rates; and
- b) assuming that the proportions of paper and card, and organic wastes in BMW remain constant;
- c) then the 2010 target would be met if both paper and card and organic wastes were captured at a rate of 63% of available material, and that the 2013 targets would be met if both paper and card and organic wastes were captured at a rate of 79%. The former is possible. The latter is slightly less realistic, but a more feasible option (owing to the nature of the materials) would be a capture of 90% and 68% for paper and card and organic wastes, respectively.

TABLE 4: RECOVERY OF BMW FRACTIONS IN IRELAND, 2004

	Growth Rate	Quantity (tonnes)	Recovered (tonnes)	Permitted to be Landfilled (tonnes)	Gap	Increase Required Relative to 2004 (tonnes)	Proportionate Increase Relative to 2004
2004		1,935,214	630,778				
2010	NBS (3.5%)	2,379,516		967,433	1,412,083	781,305	124%
	0%	1,935,214		967,433	967,781	337,003	53%
	1%	2,054,269		967,433	1,086,836	456,058	72%
	2%	2,179,365		967,433	1,211,932	581,154	92%
2013	NBS (-0.1%)	2,374,541		644,956	1,729,585	1,098,807	174%
	0%	1,935,214		644,956	1,290,258	659,480	105%
	1%	2,116,515		644,956	1,471,559	840,781	133%
	2%	2,312,760		644,956	1,667,804	1,037,026	164%
2016	NBS (-1.5%)	2,268,731		451,469	1,817,262	1,186,484	188%
	0%	1,935,214		451,469	1,483,745	852,967	135%
	1%	2,180,648		451,469	1,729,179	1,098,401	174%
	2%	2,454,319		451,469	2,002,850	1,372,072	218%

There has been a strategic blind spot where the Landfill Directive has been concerned. It is interesting to note the degree to which the Directive was given credence in national policy documents.

The Landfill Directive is mentioned within Changing Our Ways although at the time of publishing the Directive was in draft format. Although there is recognition that it will have significant implications for how waste is managed, including the diversion of biological waste, it does not try to calculate the quantities of BMW and does not begin to consider how biodegradability may be calculated.

The Landfill Directive is mentioned on a number of occasions within Preventing Waste although there is no detailed analysis of its requirements and likely impacts. Given that the document is fundamentally about increasing waste prevention and recycling, then it is difficult to understand why the implications of the Directive are not explored. One might have expected there to have been some attempt to understand how the proposals within the document would influence compliance with Directive targets, particularly with respect to the promotion

of composting and diversion of organic waste from landfill.

It is only really in the Draft NBS – in 2004 – that the Landfill Directive is discussed in any depth in major policy documents. Given the magnitude of the challenge presented by the Directive, this is somewhat surprising.

We discussed in Section 3.3 how targets had been set without much by reference to a clear rationale for action. The NBS notes that the 1998 target for diversion of biodegradable waste away from landfill set in Changing Our Ways is effectively inadequate for the purposes of meeting Landfill Directive targets:³⁶

'It should be noted [see Table 14.3] that the biodegradable municipal waste diversion target from landfill for 2013 is estimated at some 72.8% of BMW generation in that year – accordingly, the revised target remains more ambitious than the 65% target for diversion established for 2013 in Changing Our Ways.'

This is not the only target which the need to meet the Landfill Directive renders somewhat redundant. Changing Our Ways has a target for the diversion from landfill of 50% of household waste. It also suggests a target of 35% recycling for municipal waste. The NBS suggests that in 2013, the recycling rate for BMW has to be 54.4%. Furthermore, if the diversion from landfill of household waste was only 50%, and if the same rate applied to the biodegradable element of household waste, then the diversion rate for commercial waste would have to be of the order 81%. The targets in Changing Our Ways appear to be 'behind the times'.

4.1 SUMMARY

Who has responsibility for delivering compliance with the Landfill Directive? The NBS states:

'The various waste management planning regions / counties should assess their individual needs for BMW management. This approach will enable the gap or 'indicative target diversion capacity' for each region / county to be outlined....

... Regions / counties must decide how their Waste Management Plans can address these requirements.'

One might reasonably ask the question again. Where does responsibility lie? Whose job is it to make sure these targets are delivered? Against whom will sanctions be applied? Is it the County Managers? Should it be? Can they build waste facilities? Would this be fair given that they have limited room for manoeuvre in the field of waste policy? There seems to be no answer.

Ireland could, of course, be fined by the European Courts of Justice for non-compliance. In the UK, the figures quoted regarding fines for non-compliance are a maximum of the order £500,000 per day (approx €750,000 per day). The Explanatory Memorandum to the Landfill (Maximum Landfill Amount) (Northern Ireland) Regulations 2004 states:³⁸

Failure to meet the targets in the EC Landfill Directive would mean that the UK could face a non-compliance fine of up to £500,000 per day after the first target date in 2010. This fine is designed to be sufficiently strident to convince member states that investing in different waste strategies is a more acceptable alternative than being forced to pay the fine. Missed targets will also lead to greater green house gas emissions and hence potentially greater impacts on global warming.

On the other hand, the Scottish Executive notes that in circumstances of non-compliance:³⁹

finer from the ECJ under Article 228 of the EC Treaty for breach of European Community law. Although the level of penalty is a matter for the ECJ, it is likely to take into account the European Commission's own guidance in terms of which the level of penalty is calculated using a flat rate formula which is adjusted according to the seriousness of the infringement, its duration and the size of the Member State which is in breach. In the case of the UK, this could amount to a significant sum of up to approximately €0.5m per day.

We are not clear whether the same level of fines would be applied to Ireland, or how the level of any fine might be set. However, the sum may be non-trivial, and if the above fine applied to Ireland, then maximum fines for non-compliance would be around €180-270 million per annum. This is a sum which seems large enough to warrant giving people specific responsibilities to ensure it is avoided. The following sections set out to understand the issues facing Ireland as it seeks to meet Landfill Directive targets.

5.0 WASTE COLLECTION AND IMPACTS ON INFRASTRUCTURE DEVELOPMENT

A key issue in delivering a more sustainable waste management system is the way collection systems are configured. The way waste is collected can affect, in turn, the degree to which waste can be directed to specific facilities.

In the majority of European countries, the approach to collecting household waste is based upon the collection of material by a local authority, or by a private company operating under a contract to the local authority. In some countries, this may be supplemented by collections operated by, or on behalf of, enterprises with responsibilities under a producer responsibility scheme.

The pattern of funding of such services varies across the different countries.⁴⁰ Funding approaches which incorporate differential and variable charging – sometimes called ‘pay as you throw’ or, in Ireland, pay by use (PBU) – approaches are increasingly common.⁴¹ Even where PBU forms part of the funding of waste management, however, it is frequently the case that the waste management service is funded partly through the levying of taxes or user charges which are unrelated to the quantity of waste generated. This reflects the nature of the funding prior to the collection scheme being introduced (see Table 6). However, it also reflects the aims of the authorities to ensure that a proportion of the revenue from the collection service can be used to cover the costs of investments in the collection infrastructure. This is an extremely important point. PBU schemes, particularly where

they are implemented alongside collection systems which offer significant scope for separating waste, and where they are designed to incentivise waste prevention and separation of waste for recycling / composting / digestion, are susceptible to what is known as the problem of revenue instability. In other words, if the response of households is ‘too good’, then the quantity of residual waste can fall so low that the revenue raised from charging on the basis of the quantity of residual waste being set out can be too small to cover the costs of the service being provided.

The Irish case presents particular problems. To an objective observer, any country with ‘near-universal’ PBU, and with costs for disposal as high as those which prevail in Ireland, ought to have an extremely high recycling rate.⁴² Whilst progress on commercial waste has been relatively swift, progress in respect of household waste has been much slower. Household recycling rates remain at relatively low levels (particularly taking into account the potential for use of incentive based charging, and especially if it is assumed that all the waste estimated by EPA to have been uncollected is not recycled). It would appear that the recycling rate for all household waste is of the order 18% if home composting is excluded from the calculations, with the highest rates being in Galway City and Waterford (50% and 43% respectively). The relevant question is ‘why’, in so many cases, does it remain so low?

TABLE 6: RECOVERY OF BMW FRACTIONS IN IRELAND, 2004

Country	Approach to Funding Before PBU
Austria	Not known
Belgium	Flat rate household waste 'tax', or environmental 'tax' Unrelated Flat Rate User Charge
Denmark	Fixed waste 'tax', sometimes presented alongside the real estate tax Unrelated Flat Rate User Charge
Finland	Waste charge for cost recovery Unrelated Variable User Charge
France	a) Municipal tax, or b) Tax 'earmarked' for waste plus municipal tax, or c) User charge Municipal Tax, combination of 'earmarked' waste tax and Municipal Tax, or User Charges (which vary in their exact nature)
Germany	Considerable variation across Lander Unrelated Variable User Charge
Greece	Municipal Tax
Ireland	Rates system
Italy	TARSU – 'tax' on refuse designed to cover costs Unrelated Variable rate User Charge
Luxembourg	n/a
Netherlands	Variable annual fee based on a fixed amount, the rental value of the residence or the size of the household. Frequently integrated into other taxes, such as electricity. Unrelated variable user charge
Portugal	Municipal Tax
Spain	Municipal Tax, or Unrelated Variable User Charge integrated with Municipal Tax
Sweden	Unrelated Variable User Charge, frequently billed alongside other user charges
Switzerland	Unrelated Variable User Charge
United States	Varies Municipal tax, Unrelated Flat Rate User Charge, Unrelated Variable Rate User Charge

Source: Eunomia (2003), Waste Collection: To Charge or Not to Charge? A Final report to IWM (EB), <http://www.eunomia.co.uk/Charging%20report.pdf>

The links between control over the waste stream, and the viability of making new investments should not be underestimated. The context in Ireland, and the stated policy objective, is to shift waste away from landfill and up the waste management hierarchy. Unless legislation is such that disposal options, such as landfill (and incineration), are more costly than source separation routes, and unless the law is such that such a differential is likely to be sustained (either through application of market based instruments, or through regulatory actions, such as bans, quotas or pre-treatment requirements), then the case for investment in alternatives to landfill is likely to be weaker. This is more likely to be the case where such alternatives demand investment in 'throughput facilities' and where they have a relatively high capital intensity. Hence, thus far, investments in non-landfill treatments have been made at the lower end of the scale of capital intensity, and in technologies where the demand for the service is more assured through policies on recycling and the level of landfill gate fees.

Landfills are what might be called 'stock facilities'. Their throughput is limited over their lifetime rather than in any given year. The majority of other waste treatment technologies are 'throughput facilities', where the case for investment is affected significantly by whether or not a proportion of the anticipated maximum capacity can be guaranteed as throughput into the plant. The need to secure a minimum throughput of waste becomes all the more pressing as the capital intensity of the technology increases. In addition, for facilities with a lengthy expected operational life, if flows of waste cannot be secured over an extended period of time, the revenue required from each tonne of material in order to maintain a specified rate of return on capital increases. In other words, whether, on balance, the investment is likely to be viable on a commercial basis depends crucially, for capital intense facilities, on the degree to which waste can be expected to flow into the facility over an extended period of time.

In the Irish case, where collectors compete from one year to the next in respect of their access to the waste stream, and where they do so for all wastes, including household wastes, then it may be difficult

for waste collectors to make investments in non-landfill 'throughput' treatments of higher capital intensity and greater scale for the simple reason that they may not be able to guarantee the requisite flow of material into their facility which would make the facility viable (or bankable). A report for ESRI comments:⁴³

' The Mid-Term Evaluations of the relevant Operational Programmes indicated that slow progress was being made in delivery of investments in the waste management area, principally due to delays in adoption of regional waste management plans.

While some progress has been made on the physical delivery of waste management facilities, most of it outside the aegis of the NDP, the question of delivery of this vital infrastructure within reasonable timeframes still needs to be addressed.'

It should be mentioned that investments by the private sector appear to have been more significant than those made by local authorities.

If any commercial entity seeks to make a new capital investment in a 'throughput facility', then project finance is unlikely to be forthcoming unless the prospects for securing access to a significant proportion of the overall capacity are very good indeed. This could be in the form of clear cost differentials between pre-treatment and direct disposal. The issue might be taken to be more pressing the greater is the quantum of capital involved.

In the case of incineration, this clearly becomes an issue. How does one, in the Irish context, guarantee the flow of material into a 400,000 tonne incinerator such that it is a bankable option? Arguably, a local authority, or any other collector, could guarantee that the residual waste which it collects will be sent to the facility. Yet if the gate fee of the incinerator is higher than that of landfill, or if the gate fee increases relative to the cost of landfilling (for example, because gate fees offered by landfills fall), or if it makes separation at source more viable for a greater quantity of material, then if the local authority or private sector company is recovering

all costs through its charges for waste collection, presumably, it will be made less competitive relative to other collection companies who might be delivering residual waste to landfill.

It is worth relating this point back to comments being made concerning the desirability of achieving full cost recovery in local authority provided services. For example ESRI, commenting on Indecon's report, states:⁴⁴

'Closely related to the regulatory issues is the commercialisation of the sector in that this can generate competition. Much progress has been made in commercialising the waste management sector over the last decade. However, Indecon 2005 demonstrates that full cost recovery is still not being achieved in Local Authority provided services. Full commercialisation implies that operators seek to recover not only their costs but also earn a return on their investment (whether they succeed is up to the market). Private operators automatically seek this, but it is also appropriate that the Local Authorities do so in order to provide a level playing field, as well as generating a return for the taxpayers' investment.'

Sound though this principle might be in theory, in practice, in the absence of other measures, if Ireland wishes to see considerable investment in non-landfill facilities made bankable, then in (for example) PPP projects, local authorities may well have to offer guarantees of waste to those constructing facilities. The only way they would appear to be able to do this is to price services below the level which a competitive market would deliver so as to out-compete others in respect of the collection of the waste material. In short, they would need to (cross-) subsidise waste using alternative sources of revenue.

In Ireland, this fundamental point is being used as one of the arguments in favour of the introduction of a 'regulator' into the waste market. One of the possible powers which the regulator would deploy would be the power to direct waste being collected by a particular company to one or other specific facility. The broader question, however, is 'how can the institutions which govern the market be structured so as to deliver the desired outcomes?' (see Section 8.0). As we shall see, regulating waste

flows is only one of a number of possible answers to this question. Indeed, the 'waste flow manager' concept would appear to have a number of possible drawbacks, not least of which would be a temptation to over-specify capacity for those treatment facilities chosen for such favourable treatment at the expense of options higher in the hierarchy, and the fact that it may not be lawful. Equally, to overlay an apparently centrally planned and directed approach to waste movements upon an otherwise market-driven situation defies common sense. Finally, as we show below in Section 6.2.3, the justification for this type of action is rather weak on environmental grounds where incineration is concerned.

5.1 WASTE COLLECTION SYSTEMS

The financial case for the source separation of materials is heavily conditioned by the avoided costs of disposal. As disposal costs rise, then the more material which is recycled, the higher the avoided costs become.

The efficiency of logistics is also affected by collection frequencies. There is a cost associated with each bin pick-up. More efficient logistics arise where the quantity dealt with per pick-up is higher. This implies that cost optimised systems can consider reducing refuse collection frequencies in order to keep costs at low levels.

The costs of household waste collection in Ireland vary considerably (see Table 7). However, there is little by way of systematic comparison that we are aware of. A recent report by the Houses of the Oireachtas Joint Committee on the Environment and Local Government noted that flat fees ranged from €180 to €510 per household per year.⁴⁵ Fees for sacks were noted to range from €1.50 to €8.00. These ranges indicate:

- An apparently high level of costs for collection and treatment / disposal of waste. This increases the likelihood that households will not avail themselves of collection schemes;
- A rate structure which shows considerable potential to encourage fly-tipping. High marginal costs, of €8 per sack, are apt to encourage households to evade charges by dumping, or other forms of illegal activity.

TABLE 7: CHARGES FOR HOUSEHOLD WASTE COLLECTION

Authority Area	Private Operator?	Charge
Cavan		€4.45 per branded bag. Includes Town Councils at Belturbet, Cavan & Cootehill
Clare	Private Operator	€199/6 months/240 litre bin up to 400 kg. 17.5c/kg above or below
Cork		Proposed standing charge: €120 charge. 46c per kg. Quarterly billing. All town councils
Dun Laoghaire/ Rathdown		€80 standing charge. Lifting charge: €4/140 or 240 litre bin. Weight charge: 20c per kg
Donegal	Private Operator	Between €240 & €360 pa. Volume system
Fingal		Tag System: €6 & €3.35 per tag based on size
Galway	Private Operator	€350 per 240 litre bin & €275 for 120 litre bin
Kerry		€200 flat fee for a disc & €6 per black bin lift. Dry recycling bags: €5 for 4
Kildare		€185/240 litre bin + €7 per lift. €140/140 litre bin + €5 per lift. Tag system in Newbridge & Leixlip
Kilkenny	Private Operator	€395/240 litre bin, €295/120 litre bin & €240/90 litre bin. Bags: €5ea. Recycling bags: €1.50 ea.
Laois	Private Operator	Flat fee €300 pa/140 litre bin & €366 pa 240 litre bin. Mountmellick & Portlaoise included.
Leitrim	Private Operator	€9 per lift of 240 litre bin, €6 per lift of 240 recycling bin; 140/€6/lift; €5/140/lift.
Limerick	Private Operator	240 litre bin/6 months/€199 up to 400 kg & 17.5c for each kg above or below
Longford	Private Operator	€140 flat fee, 17c per kg
Louth	Private Operator	€13/lift/240 litre bin. Monthly recycling lift: €3
Mayo		€355/240 litre bin. €300/ 140 litre bin proposed
Meath		€360pa/240 litre bin, €300 pa/ 140 litre bin. Recycling: €60 pa.
Monaghan	Private Operator	€178 + €11.50/100kg thereafter. Includes recycling.
North Tipperary	Private Operator	€380/240 litre bin, €300/140 litre bin, €250/120 litre bin.
Offaly	Private Operator	€25 per month/140 litre bin, €30 per month/ 240 litre bin.
Roscommon	Private Operator	€350/240 litre bin, €275/120 litre bin. Separate Operator charges as Leitrim
Sligo	Private Operator	€9/lift/240 litre bin, €5 per bag, Recycling bags: €1.50

Authority Area	Private Operator?	Charge
South Tipperary		€200 flat fee, €6 per wheelie bin tag, 50c for dry recycling bag. Also applies: Carrick-on-Suir, Cashel & Tipp councils.
South Dublin		€6 & €3 tag/ standard & small wheelie bin
Waterford		€13/lift/240 litre bin, €7.50/ brown bin food waste. €2.25/ dry recycling per bag. Also applies: Lismore & Tramore.
Westmeath		€8/lift/240 litre bin, €4/240 litre recycling bin, €5/lift/120 litre bin. Also applies: Mullingar Town Council.
Wexford		€466/240 litre bin, €329.20/140 litre bin, €235.30/80 litre bin. Also applies: Enniscorthy, Gorey, Wexford town.
Wicklow	Private Operator	Flat fee: €392/240 litre bin. Weight charges to be determined.
Cork City		Flat fee: €255+ €5 per tag/240 litre bin, €3 per tag/140 litre bin
Dublin City		Flat fee: €80 + lifting fee of €5/ 240 litre bin. €65 + lifting fee of €3/140 litre bins. Bag Tags: €2.50
Galway City		Flat fee: €351. Pay by use scheme to be introduced in Knocknacarra-fees to be determined.
Limerick City		€190/6mths/240 litre bin up to 400kg, 17.5c/kg above or below.
Waterford City		€80 pa, €4.50/lift of a grey bin, €1.50/brown/ green bins
Clonmel Borough		€200 standard charge, €6/bin, 50c/tag (recycling bin)
Drogheda Borough	Private Operator	Panda Waste: €265 pa/240 litre bin or €10/lift. Oxygen: €324/240 litre bin, €264/140 litre bin.
Kilkenny Borough		€5 standard bag. Recycling bag: €1.50
Sligo Borough	Private Operator	€9/240 litre bin, €5 per standard bag. Recycling bags: €1.50.
Wexford Borough		€466/240 litre bin, €329.20/140 litre bin, €235.30/80 litre bin

Source: Indecon International in association with the Institute of Local Government Studies at University of Birmingham (2006) Indecon Review of Local Government Financing, Report Commissioned by the Minister for the Environment, Heritage and Local Government

There has been some criticism of private waste collectors in their approach to charging households for waste collection. DOEHLG, in their Consultation Paper on regulation of the Waste Management Sector, state:⁴⁶

'However, where there is a competitive market for a utility such as waste collection, it is open to service providers to decide to cherry-pick their customers by competing only in the areas which have the type of customer base which would maximise their profits.'

This is a strange portrayal of the existing situation, given that it could easily have been anticipated as a logical outcome of the existing market structure. The following comments seem worth making:

1. Genuine marginal cost pricing, in the spirit of full cost recovery, might indeed imply that the marginal costs for collecting waste from a house in a remote area is expensive. There are a number of reasons for this, but one of them is not the standard argument that waste collection is necessarily and always more expensive in rural areas (whether or not it depends on how it is done). What is clear, however, is that in adding small numbers of such households to an existing collection round, the likelihood is that the same vehicle and crew will be used rather than one that is adapted for the demographics of the area. This might imply, for example, that refuse collection vehicles with a driver plus two crew could be used to collect waste from remote parts. That is not a cost effective way to collect waste in such situations, and for that reason, high marginal costs are to be expected. Given that households are free, in Ireland, to choose to avail themselves of a collection or not, then it might be somewhat futile to 'market' a service to households which, if charged for at the margin, is likely to be declined on the basis of the price at which it is offered. As such, what appears to be implicit in the accusation that private sector collectors cherry pick' their customers is that customers in more sparsely populated areas should not be free to decline the offer of a service, irrespective of its cost;

2. The structure of charges being offered by private companies to households is likely to reflect their strategies for recouping investments made in collection infrastructure and sorting / treatment / disposal capacity. In a year-to-year competitive situation, it seems possible that some would try to adopt an approach which amounts to seeking repayment on investments in a relatively short time horizon from their customers (and indeed, this is normal commercial practice for profit-making enterprises). This might lead to higher costs in some areas, depending upon the propensity of consumers of the service to change their provider. As regards charge structures, there may be some who tend towards a model where a management fee is set alongside smaller variable elements, whilst others levy no management fee and charge on an entirely variable basis. Other things being equal, one would expect the former to characterise the approach of a company which had invested in its own infrastructure, whilst the latter might reflect a company whose principal investment was in vehicles, with the cost of dealing with materials being dealt with primarily as a variable cost, reflected in gate fees for sorting / treatment / disposal.

The second issue is especially relevant. In a context where there is uncertainty (for collectors) as to what their customer base might be from one year to the next, the argument in favour of collectors themselves investing in non-landfill treatment is not easy to make.

This might help, in part, to explain why alternatives to landfill (whether recycling, composting, or treating residual waste) for household waste are not more developed than they already are, even though collection costs for households are increasing to levels which would seem readily capable of sustaining such investment.

The situation may change, but it is only likely to do so if either national legislation, or local by-laws, make it binding upon all waste collectors to offer services with a minimum level of service. For example, this might be specified in terms of a minimum number

of materials to be collected separately, and for each, a minimum frequency of collection, with the onus being placed on collectors to reduce, therefore, the costs of refuse collections.⁴⁷

Finally, one cannot help but ponder the logic of the existing system. Is a fully competitive market for waste collection services likely to deliver the best outcomes? Does it make sense to be allowing a situation to arise where:

- Different companies' trucks potentially service the same street;
- The mere fact that different companies do this potentially *increases* the *marginal* cost of provision of the service.

The Indecon Review of Local Government and Financing states:⁴⁸

The issue of appropriate regulation is particularly relevant in areas where local authorities have withdrawn from service provision and where private suppliers are now filling the gap. This is a particular issue in the market for refuse collection, where a number of different delivery mechanisms are now in operation. These include direct provision by local authorities, contracting out/ franchising out, and where local authorities have exited totally from provision and the service is now provided by a private operator. It is this latter case where appropriate price and quality regulation is required to ensure that service standards are maintained and that consumers are not paying excessive prices. These developments pose questions for regulatory authorities and the optimal manner in which local authorities should withdraw or contract out services. Waste management is an example of one area where regulation is needed. In the cases where a competitive tendering process for a franchise arrangement is implemented additional regulation may not be necessary. (our emphasis)

The emphasised part of the quoted text seems to argue that under the existing approach, regulation may be required in some cases, but if franchising approaches were adopted then no regulation would be necessary as long as the tendering for the franchise was competitive. It does not go so far as

to recommend the latter in all cases. It does hint at the fact that, perhaps, the manner in which local authorities have withdrawn from service provision might not be optimal, and presumably, a way of addressing this might have been to implement a competitive tendering arrangement. It would be possible in such arrangements for the pricing of services to remain the responsibility of local authorities within the framework of an overall service payment to the existing contractor. Such tendering processes could, thereby, allow local authorities themselves to set charges to allow full cost recovery in the round.

The same passage (to that quoted above) is interpreted slightly differently by DOEHLG in their Consultation on Regulation of the Waste Management Sector:⁴⁹

'The Indecon Review of Local Government Financing was published in March 2006. This report recommends the establishment of an appropriate regulatory framework to protect consumer interests and to prevent excessive profits being generated in cases where local authority services are contracted to private sector local monopolies.'

This is one interpretation of what the Indecon review seems to have said, and not necessarily one that would be shared by all who read it. Indeed, the case where local authority services are contracted to 'private sector monopolies' is the likely outcome of a competitive tendering process.

Later in the same document, DOEHLG notes the views of the Competition Authority:

'the Competition Authority did comment that the household waste collection market was not working well for consumers. The Authority reviewed the ways in which similar services were provided in other countries and concluded that the competitive tendering of waste services contracts could yield significant cost savings for consumers.'

This would be our view too. The nature of regulation, in this case, would be to ensure the procurement process was carried out with due care, and was competitive.

These types of consideration are likely to be relevant in understanding why, for example, the rate of recycling for household waste is not higher than it currently is (a full analysis is beyond the scope of this work). On the one hand, the pricing of services, especially if they are genuinely at marginal cost, is unlikely, necessarily, to be optimal from the point of view of a pay-by-use strategy. The case for natural monopoly (albeit, a position awarded on the basis of competitive tendering) may be reasonably strong where household (and possibly other) waste collection services are concerned. On the other hand, the lack of certainty of control over a specific waste stream, engendered by the competitive nature of the collection market, may be hindering the development of the very infrastructure which might be expected to enable the development of collection systems of more encompassing scope (in terms of materials collected separately for recycling), such as in-vessel composting facilities, anaerobic digesters and more complex sorting facilities (which is not to say that such investments have been entirely absent).

It is to the issue of infrastructure provision to which we now turn.

5.2 INFRASTRUCTURE PROVISION

The move away from landfill can be conceived as a shift from 'stock' facilities to 'throughput' facilities. The former's capacity in a given year is limited by the remaining void, the latter's is constrained by the size of the facility. Landfills have a long lifespan, including considerable aftercare periods. 'Throughput' facilities have more-or-less well-defined lifespans. This gives rise to different requirements in terms of how the facilities ensure that a return can be made on the initial investment. For throughput facilities, ensuring an adequate rate of return comes down to ensuring that sufficient quantities of waste will be attracted to the facility at a viable gate fee.

The nature of the Irish collection market is one where:

- In some areas, collection is carried out by local authorities;
- In some areas, collection is franchised out to private contractors;

- In some areas, the private sector is openly competitive.

Even where collection is carried out by local authorities, it might be difficult for a local authority to prevent private sector operators seeking to compete with that service unless local byelaws prevent this. Where local authorities are collecting waste, this becomes an undertaking, and it cannot take actions which would give it a competitive advantage (for example, by restricting the issue of Waste Collection permits, or by limiting the scope of wastes covered by these).

In this context, there can be said to be limited 'control' over waste by any organisation. The plan in Dublin to build an incinerator of 400,000-600,000 tonnes capacity looks, therefore, problematic. The issue is how does one ensure that the project is attractive to project financiers? This amounts to a question as to how the flow of a considerable quantity of material into that facility can be assured. How could one do this whilst seeking to ensure full cost recovery from households and businesses? What happens if the gate fee for the incinerator is above that which exists for landfill (and these are coming down)?

It is exactly this issue that appears to have been in the minds of DOEHLG in the Consultation on the Regulation of the Waste Management Sector. Financiers would be unlikely to finance a large capital intense facility unless around 70% of the throughput could be guaranteed. If no collection organisation can guarantee its ability to do this in the future, how can the facility be made bankable? One option, considered by DOEHLG in its Consultation on Regulation of the Waste Management Sector, is to regulate the movement of wastes, possibly extending to directing waste to specific facilities.⁵⁰

'The Minister has recommended that "relevant authorities, in preparing waste management plans, determining the necessary statutory authorisations and in regard to other associated waste management functions, should recognise that the application of the proximity principle does not entail interpreting administrative waste management planning boundaries in such a

manner as to inhibit the development of waste infrastructure which will support the attainment of national waste management policy objectives through the rational development and use of such infrastructure.”

A regulator could be empowered to direct waste to an appropriate facility in a different region in such cases. In addition, it could also be open to a regulator to direct waste to facilities which are higher up the waste hierarchy so that the waste is dealt with in the most environmentally sound manner. The regulation of facility gate fees could also be used by a regulator for this purpose.’ [our emphasis]

The final two sentences would, in our view, be extremely difficult to justify in law. In particular, where incinerators are concerned, it is worth re-stating that incineration is, for the time being, disposal.

Another approach which has been considered for the purposes of regulating waste flows is the use of waste collection permits to direct waste to specific facilities. Another argument might be in respect of economies of scale. A report for ESRI wrote:⁵¹

‘It is important that the administratively imposed regional structures do not impact on investment decisions for major infrastructure such as landfills and incinerators, specifically the number and size of these facilities. These should be decided on economic grounds, taking into account environmental implications. Considerable economies of scale exist in the delivery and operation of these facilities: fewer, larger landfills and incinerators will cost society less than a larger number of smaller facilities. Not to take this on board will impose considerable excess costs on society. The Department of the Environment, Heritage and Local Government’s recent guidance to the effect that movement of waste across regional boundaries is not contrary to the proximity principle is welcome in this regard.’

Yet it would be difficult to justify a view that, for example, an incinerator needed to be of 400,000 tonnes capacity to be economic. In particular, this case would be very difficult to make given the

possible scale at which alternative treatments could be built, or in the light of the fact that the ‘catchment area’ would become so large that there is a distinct possibility that supposed economies of scale (marginal at 400,000 tonnes) would be lost when set against the additional haulage costs of material coming from more distant locations (indeed, the somewhat absurd conclusion one would reach if taking the logic in the above statement through to conclusion is that one facility should be built for the whole of Ireland).

We understand that one of the arguments for directing waste is based on the view of the European Court of Justice in the case of *Entreprenorforeningens Affalds/Milosektion (FFAD) v Kobenhavns Kommune C 209/98*. Other case law suggests that arguments to restrict movements of waste (especially when they are to a disposal facility) may be important.

For example, the European Court of Justice has discussed twice the issue of local monopolies, in cases C-209/98 and C-203/96 (*Dusseldorp*). In case 203/96, a Dutch holder of waste wanted to export that waste for recovery to Germany. However, the Dutch authorities refused and asked him to give that waste to the Dutch waste incinerator; this was based on a Dutch rule according to which exports of waste could only be authorised, when the waste could be dealt with in a “superior” way abroad. This was not the case: the processes in the Netherlands and Germany were comparable. The Court did not accept the export ban. It declared that the intention of the Dutch government to provide for economic efficiency of the Dutch incinerator was an economic argument that could not justify export restrictions. The export, including the transport, did not create greater risks for health and the environment.

The Court did not accept the Dutch argument derived from Article 176 EC (more stringent measures). It effectively declared that the objections against a shipment of waste for recovery are laid down in Article 7 of Regulation 259/93 (now in Reg.1013/2006). Shipments of waste which are to be disposed abroad, may be prohibited altogether. In case C-209/98, the Court allowed a local monopoly. However, this is because there was a rather specific situation in Copenhagen which

– according to the Court – could not be solved otherwise. The judgment, therefore, appears to reflect a view that normally, local monopolies are not allowed (see C-203/96) and that there must be specific, exceptional reasons for allowing such a monopoly.

From this, it might follow for the Irish situation, that an effective monopoly for a given incinerator would be very difficult to justify, particularly if the producer or holder of waste wants to recover or recycle the waste abroad. There would not seem to be any specific circumstance justifying this monopoly, all the more so as an incinerator would receive, in contrast to case C-209/98, all forms of waste not just (or not any) construction and demolition waste. The situation could be considered to be different when waste is to be disposed of, as there is a legitimate reason to limit shipments of this kind to the maximum. However, incineration itself is currently defined as disposal.

The situation is no different for waste that is to be recovered within Ireland, as Member States have to align their legislation for internal shipments to that of the EC shipment regulation. The Court has decided, in cases concerning waste oils, that a Member State was not allowed to create local monopolies for waste oil recycling (legislation from the early 1980s already).

The size of the incinerator may also play a role as the existence of such an approach would have the effect of increasing the temptation for the authorities to create a local monopoly the larger the capacity of the incinerator becomes.

This does raise, again, issues concerning the scale of facilities (as discussed in Section 3.2). For the Dublin Region, if the targets in the RWMP were 'just' met (and the commercial waste recycling rate was already 33% in 2003 compared with a target of 41% in 2013) for recycling, the predicted quantity of all residual commercial and household waste would be 580,390 tonnes, of which 237,600 would be household waste. The challenge of ensuring that 400-600,000 tonnes arrive at one facility would appear to be significant. Furthermore, if the challenge is to be taken up by government on an

operator's behalf, then there must be a temptation for an operator to simply increase the capacity of a given facility (with implications for competition, transport, movement of waste up the hierarchy, etc.).

It is worth quoting a report for ESRI regarding this issue:⁵²

'Landfills and incinerators are subject to significant economies of scale, so large facilities are more efficient than small ones. Left to its own devices, the industry will be inclined towards providing a small number of large facilities, with lower overall societal cost. However, this could lead to regional monopolies or oligopolies, where operators could potentially abuse dominant market positions. It may prove difficult to maintain more than one viable waste collection service, particularly in smaller towns or rural areas, with the possibility again of local monopolies arising.'

Again, the view is driven by one in which scale economies of treatment dominate the perspective. In our view, the specific context and demographics of Ireland are unlikely to be conducive to small numbers of large facilities of a 'throughput' nature unless the conditions for such monopoly are created in the first place. This is because of the need to secure waste coming into the facilities.

Three options appear available, though none necessarily secures delivery of waste to a *specific* facility:

- a) employ market-based instruments to give greater certainty regarding the price of different treatments. The current situation is one where a landfill tax exists, but there is no tax on incineration (which analysis in Section 6.2.3 below appears to suggest there is an argument for). The landfill tax is at a relatively low level, partly one assumes due to the high level of pre-tax gate fees. These are, however, beginning to fall as competition increases, and void space availability improves;

- b) employ regulatory instruments restricting the quantity of waste which can be landfilled. This could either be through setting pre-treatment standards for all landfilled waste (see Section 7.0) or through some form of allowance trading mechanism, as applied in the UK (but only, in that case, for biodegradable municipal waste);
- c) require authorities to tender services in their area on the understanding that the winning tenderer has exclusive rights to collect waste in that area (and discussion would need to occur as to whether this was appropriate for all waste, or only household waste).

a) and / or b) could be combined with c).

It is interesting to note, in respect of a), that a report by ESRI suggests:

'As waste management services are largely self-financing, there is a limited role for central Government funding. Provided environmental externalities are fully internalised via EPA regulations and enforcement, the landfill levy and possibly an incineration levy, there should in theory be no need for further public subvention of recycling, composting or related activities.'

In other words, the familiar argument of orthodox economists – if externalities are internalised, then the market will deliver the most desirable outcome.

6.0 RESIDUAL WASTE TREATMENT IN IRELAND

One of the most contentious aspects of the development of waste policy in Ireland has been the approach to dealing with residual wastes. Landfill sites have always had their own detractors, and very often, for good reason. But in all policy statements, and in every RWMP, the presumption has, by and large, been that there are essentially two options for dealing with residual waste:

- Landfill; and
- Energy from waste / incineration / thermal treatment.

Given that:

- EU policy states that the amount of biodegradable waste sent to landfill should be reduced progressively over time; and
- Neither national policy, nor the RWMPs, seek to achieve this target wholly through waste prevention and recycling.

then it becomes axiomatic that – if the only way of treating waste other than landfill is taken to be thermal treatment – then national policy appears to be completely wedded to the idea that Ireland must have incineration. At times, the argument is represented in such a way that Ireland needs incinerators because other countries already have them.

It is misleading to paint the picture as starkly as a choice between landfill, and incineration / thermal treatment. The picture in respect of residual waste treatment is rather more colourful than this dichotomous choice would suggest. To ignore alternatives clearly has the potential to generate sub-optimal outcomes, and in the field of waste, it could also cause some public disquiet. It is not clear why incineration would necessarily be the most appropriate solution for all Irish regions, and neither is it clear that it can be easily delivered in the existing institutional context (see Section 8.0).

Even in situations where the choice has been misrepresented as a choice between either incineration or landfill (in which one might expect incinerators to fare quite well), some of the evidence suggests there is little to choose between the two in the eyes of the public, even in this somewhat limited form of appraisal of the available options.

A Forfas report, referring to a survey by ERM, states:

*'57% of respondents said they would be opposed to the idea of having an incinerator located close to them. Yet when asked in general terms whether they would prefer their weekly household waste to be incinerated or landfilled, a small majority of respondents opted for incineration, as illustrated in Figure 2.2.'*⁵³

Actually, as the report shows, the balance of responses was 46% to 44% in favour of incineration, with females and younger age groups actually showing a preference for landfill. This can hardly be said to be a ringing endorsement for the technology.

The question arises, therefore, as to how we have come to be where we are? What is the case for thermal treatment / incineration / waste to energy (WTE) / energy from waste (EfW) (and why the proliferation of terms)? When the time available to meet the Landfill Directive targets is so short, why is the most favoured option the solution which takes longest to deliver?

In this section, we first investigate the case put forward for incineration. We then present some alternative views. We then explore the way in which alternative treatments have been dealt with in policy documents and the RWMPs. We go on to review the way in which the term 'integrated waste management' has been deployed, and how it has come to be interpreted as 'waste management with some incineration'. Finally we look (not in an extensive way) at simple alternatives to incineration which hold out the prospect of speedy delivery, and swift compliance with the Landfill Directive.

6.1 ANALYSIS OF THE CASE FOR THERMAL TREATMENT

6.1.1 NATIONAL POLICY

In 'Changing Our Ways', different technological options are presented. However, as regards residual waste, the only technologies presented are Waste to Energy Incineration and Thermolysis. The presentation on WTE is more extensive than for other technologies. No biological treatment facilities for residual waste are mentioned.

Interestingly, there is a stated policy aim within the document that Waste Management Plans should include:

'planning for and the provision of requisite infrastructure, which should substantially come on stream within a period not exceeding 7 years.'

The lead times for the development of EfW plants are not short. Indeed, the time taken to bring the facility in Dublin to fruition will have been in excess of this. A recent SLR report suggests that the average lead time for incinerators in EU Member States is of the order 10 years.⁵⁴

The 2001 Forfas report on Waste Management in Ireland seeks to present a strong case for thermal treatment. It cites studies which suggest no increases in dioxin levels above background levels around incineration plants, and argues that emissions standards are now much tighter than in the past. It argues that Ireland is 'critically lacking in thermal facilities':

'Ireland is Critically Lacking in Thermal Treatment Facilities: *Ireland is currently devoid of any central facilities for the thermal treatment of non-hazardous waste. This contrasts sharply with the situation in most European countries, where thermal treatment is the leading technology in the transition away from landfill towards the protection of human health and the environment. In fact, its role in the safe treatment of waste is particularly significant in countries such as Denmark, Germany and the Netherlands who are seen as having enlightened and progressive environmental policies.'* (our emphasis)

Elsewhere, it notes:

'Incineration is a form of waste treatment that allows for energy recovery. Currently, there are no thermal treatment facilities in Ireland for municipal waste and only limited private facilities for hazardous waste treatment. In this regard, Ireland is again out of step with those countries in Europe that are regarded as being progressive and proactive in the area of environmental protection. Denmark, Sweden and the Netherlands, for instance, each incinerate between 35% and 50% of waste generated.'

One argument seems to be, therefore, that Ireland should develop incineration capacity because other countries have done so in the past. This is not an especially well thought-out reason.

Another argument is based around the waste management hierarchy:

'European experience has shown that even with efficient waste prevention, minimisation and recycling programmes, it is inevitable that wastes of a recalcitrant nature will be generated. Furthermore, in terms of addressing these waste streams, internationally accepted waste management hierarchies rank thermal treatment, carried out in accordance with high environmental standards, as being environmentally preferable to disposal by landfill.'

*This position is reflected in national environmental policy. The 1998 government document *Changing our Ways* proposes that, where technically and economically feasible and subject to appropriate attention to material recycling, thermal treatment with energy recovery or other advanced thermal processes are among the strategies that should be considered as part of an integrated waste management strategy.'* (our emphasis)

Our reading of *Changing Our Ways* is that it is not prescriptive on residual waste treatments. Rather, its failing is the lack of a full range of alternatives considered therein. The document appears to be trying to make a link from *Changing Our Ways* to a need for 'thermal treatment with energy recovery'. As previously stated, the absence of consideration of alternatives, coupled with the desire to move waste away from landfill, can lead one very easily to the view that 'thermal treatment' is a necessary component of waste strategies.

The case is also made on environmental and health grounds:

'Thermal treatment is regarded as being more environmentally desirable from the perspective of human health, and a more environmentally sustainable waste management option than landfill. The energy by-product of incineration can be recovered, displacing the need to burn fossil fuels, and consequently reducing greenhouse gas'

emissions. Currently, about 60% of Danish households get their heating and hot water from district heating plants, many of which are fuelled by waste.'

We are particularly interested in the terminology. The language states that thermal treatment 'is regarded as being' more environmentally desirable. This begs the question, 'by who?' As we shall see, this is not obviously the case, and some authors would certainly 'regard' the matter differently.

The Forfás document acknowledges that Ireland depends (and it still does) on other countries to treat its hazardous waste, and it suggests that incineration is the best method by which self sufficiency in this area can be achieved. It fails to point out that the air pollution control (APC) residues from incinerators are themselves regarded as hazardous, so pursuing incineration would require these residues to be dealt with elsewhere. As far as we are aware, the plan for the Elsam incinerator in the Dublin region is to export the material to Germany or Norway.⁵⁵

The case for incineration is also linked to economic development:

'Unless Ireland develops the essential infrastructure, its lack of thermal treatment facilities may prove to be a deterrent for future investment in this country, and expansion capital may be diverted to countries with a fully integrated approach to waste management.'

As with Changing Our Ways, biological treatments such as variants of MBT are not mentioned at all within the Forfas 2001 report.

Preventing Waste contains very little on any form of residual waste treatment. However, within the overall objectives of the policy statement is written:

'... emphasis must be given to the widest practicable realisation of waste prevention, minimisation, reuse, materials recycling and biological treatment, before energy recovery through thermal treatment, and final disposal in landfill.'

Even here, therefore, it is implicit that thermal treatment is the way forward in terms of residual waste management. In defense of the wording, it must be said that by this time, the RWMPs had already been written. These had already arrived at the view that incineration would be a component of the plan.

Later on in the document (in the 'recycle' chapter), thermal treatment is set within the EU context:

'thermal treatment with energy recovery is utilised by almost all other EU Member States and plays a significant role in waste management practice within most of these (seven Member States reported thermal treatment of between 23% and 55% of municipal solid waste arisings).'

Taking Stock continues to argue in favour of a hierarchical approach despite the fact that this was published after European Court of Justice (ECJ) rulings in 2003 which effectively re-defined incineration as a disposal operation, not recovery.⁵⁶ The document acknowledges that Thermal Treatment plants raise considerable opposition due to health concerns, and since the plants may prejudice the achievement of recycling targets. In relation to health concerns, it argues historic plants cannot be compared to modern incinerators and that:

'The most stringent international controls on facilities of this kind have been laid down in the EU Directive on Incineration (2000) and these have now been transposed into Irish law. The requirements are given effect through the rigorous IPC and waste licensing systems operated by the EPA.'

In seeking to rebuff the argument that incineration can crowd out recycling, the report states that:

'While this would be a danger were thermal treatment to be employed in a waste management policy and planning vacuum, the reality is that thermal treatment is included in Irish waste management policy on the basis that it is one element in an integrated approach.'

Ambitious targets are set in relation to recycling at national level; these are carried through into local authority waste management plans and are now being realized progressively with the roll out of recycling infrastructure. The experience of certain other EU Member States is also instructive in this regard, as they have shown how significant levels of recycling and the use of thermal treatment can comfortably coalesce.'

We have discussed the issue of targets above. There, we argued that in reality, the targets were not especially carefully set. For this reason, there is every reason to believe that incineration would crowd out other approaches which have more to recommend them on environmental grounds. No role is mentioned for any other residual waste treatment options such as MBT.

The affirmation of thermal treatment as a sound option continues in the NBS. The first main statement on the treatment states:

'Thermal treatment with energy recovery in accordance with the internationally-accepted waste management hierarchy is a key element of Irish waste management policy.'

MBT is actually discussed in the report, albeit after thermal treatment, and no such defensive justification is applied to it. As we have already mentioned (and as we discuss below), at the time of writing of the NBS, thermal treatment with energy recovery was actually at the bottom of the hierarchy, being classified as disposal. The above quote is repeated verbatim later in the strategy, along with positive messages relating to a reduction in dependence on fossil fuels.

The document also states that:

'Finally, all countries with high landfill diversion rates use thermal treatment for a considerable proportion of traditional, 'mixed waste' collection of BMW'

going on to state that MBT is only used on a small fraction of arisings. The latter is not true in Italy, for example, where current capacity is around 10 million tonnes.

It is also interesting that in relation to MBT the residues are mentioned as being required to go to thermal treatment or landfill. In the discussion on thermal treatment no mention of residues is made, even though the plan for the Poolbeg incinerator is to export APC residues to mainland Europe because of their hazardous nature. Stabilised biowaste is later stated to have 'limited applications'.

Whilst less emphasis is placed on MBT than thermal treatment in the strategy, there is more mention of MBT than was present in the Draft Biowaste Strategy. For example, section 5.1 includes a paragraph:

'Other options that will be pursued to divert BMW from landfill include thermal treatment – which enables the energy content of the residual waste to be captured and used, and pre-treatment systems that decrease the biodegradable content of residual waste prior to thermal treatment, mechanical biological treatment (MBT) or landfill.'

In the draft strategy no such reference to MBT exists. What is present in the draft strategy but not the final strategy is the statement:

'The development of MBT should not deflect local authorities from the longer term targets of regional waste management plans in terms of recycling and energy recovery performance and sustainability.'

Again, it would appear that the emphasis is firmly on 'energy recovery' as the end game for the local authorities.

The 2006 Forfas document "Waste Management Benchmarking Study: A Baseline Assessment" shows the waste management hierarchy separating out energy recovery from disposal. As mentioned above, this is 3 years after the ECJ judgements re-defining incineration as disposal and not recovery.⁵⁷ The 2006 Forfas report ranks 10 'benchmark countries' based on the level of recycling and thermal treatment. It does not include any other form of residual waste treatment. It again acknowledges that:

'Of the ten countries benchmarked, Ireland is the only one without WTE infrastructure in place. Most of the benchmark countries combine

high recycling with high WTE and low landfill reliance. Singapore landfills just five percent of its municipal waste reflecting the fact that land is at a premium due to it being a country with a population of four million people in an area equivalent in size to County Carlow.'

The second paragraph does beg the question as to how appropriate the choice of Singapore was for a Benchmarking study. Both may be considered 'tiger economies', but the similarity probably ends there, and in respect of waste management, it is not clear what features of Singapore could really be considered appropriate for comparative appraisal in the waste management context.

6.1.2 REGIONAL WASTE MANAGEMENT PLANS

Again, in the RWMPs, there is a strong focus on incineration as the technology of choice for residual waste. Strategies and current state of development for the regions (where policy or progress has been made) are summarised as follows:

RPS-LED

- Dublin is probably the most advanced in its procurement of a facility, sized at up to 600,000 tonnes/annum for non-hazardous municipal or similar wastes. It was first proposed in the 1997 RWMP. The earliest possible construction date is reported to be 2008 and as such operation is unlikely to begin much before 2010. This lead-time (the project commenced in earnest in 1999) is potentially sobering for other regions seeking to follow suit;
- The North East plan states the objective to develop a thermal plant of 150,000 to 200,000 tonnes per annum by 2007. Both a licence and a planning consent have been obtained for the development of a facility at Carranstown in County Meath by Indaver Ireland Ltd;
- As of 2006, the Midlands region was yet to commence its thermal facility feasibility study, and capacities are not stated;
- The Limerick/Clare/Kerry region recognises the need for thermal treatment provided by the private sector, provision to commence during the 2005-10 plan period. The anticipated operational period for a facility (as stated in

the thermal treatment feasibility report) is 2010 through to 2030;

- In Connaught, The stated policy is:

'Provide thermal treatment to service the Region as part of an integrated approach to waste management in line with EU and National Policy. (It is estimated that a thermal treatment plant with a capacity of c. 175,000 tonnes per annum will be required to serve the Region by 2016).'

- In Donegal, the RWMP states:

'However to comply with the 2010 landfill diversion targets there will be a need in County Donegal for access to alternative waste management technologies e.g. MBT, Energy Recovery. Due to economies of scale such facilities are unlikely to be located in County Donegal and some waste from the County is likely to be transported to adjacent planning regions to access the alternative technologies e.g. North West Region Waste Management Group (NWRWMG). The NWRWMG have recently completed the consultation of the Review of their Waste Management Plan and the final Plan was been published in June 2006.' (our emphasis)

It is worth noting that the NWRWMG is the regional group across the border in Northern Ireland. Transfrontier shipments of waste to and from Ireland can be expected to be problematic, if not impossible, for some time to come.

CITY AND COUNTY OF CORK ⁵⁸

- Despite Cork's environmental and economic assessment favouring incineration, public consultation led the region to adopt an MBT approach (recycling, mechanical separation and use of residual landfill without energy recovery is the preferred option in the 2004-9 City Plan). The MBT approach is mirrored in the 2004-9 county plan and details are expanded to some extent. The plant is described as including a biological phase for both the screened residual waste and also for clean separately collected green waste. Sizing for phase 1 (scaleable by a further 50% for a potential future phase 2) is 150,000tpa

for residual waste and 35,000 for separately collected green waste. Timing for the facilities is still unknown. The county plan states that negotiations are at an advanced stage with a preferred tenderer and that construction of the facility was intended to commence during 2005.

However, despite this intended adherence to an MBT approach, the revised city plan proposes a feasibility study for thermal treatment of residual waste. This is at clear odds with the fact that energy recovery was specifically excluded within the preferred Scenario 2 of the strategy adopted by both the City and County Councils. Indaver has had a planning application for an incinerator sited in Ringaskiddy accepted. This two phase facility is to be a 100,000 tpa fluidised bed incinerator for hazardous/non-hazardous solid/liquid waste, plus a further 100,000 tpa standard grate incinerator that

'...may accept [...] non-hazardous solid industrial, commercial and household waste.'

The 2004 National Overview of Waste Management Plans also states:

'It is envisaged that a possible second phase of [the Ringaskiddy] project would have capacity for municipal type wastes.'

When one considers that Cork County municipal waste arisings are projected at 264,000 tonnes for 2009, and that **minimum** recycling is to be 35%, this leaves an annual residual tonnage of around 170,000 tonnes. This is clearly far less than the combined capacities of the MBT and incinerator facilities.

The planning application on the incinerator has been accepted despite a) refusal by the local authority, b) potential for competition for insufficient material with MBT facilities, and c) the views of the senior planning inspector involved, as expressed at an appeal against the initial refusal to grant permission. Interestingly, An Bord Pleanála cited, as the reason for granting permission, the fact that incineration

is effectively government policy:

'(A) In deciding not to accept the Inspector's recommendation, the Board concluded that the proposed development is in accordance with the objectives of the National Hazardous Waste Management Plan and in particular its recommendation of priorities for the period 2001-2006 [Chapter 9.7 items 1 to 9]. The Board considered that these priorities are intended to be provided in parallel (and not in any particular sequence) as part of an integrated approach to the management of waste. Furthermore, having regard to the amount of hazardous waste being produced in the country it is considered that the scale of the proposed development is not excessive. In relation to the non-hazardous element of the waste the Board considered that the proposal to incinerate this element was in accordance with national policy as set out in "Changing Our Ways".'⁵⁹

Notwithstanding the positive views on incineration expressed in national policy documents, it is difficult to read Changing Our Ways in such a way as to draw the conclusion in the final underlined section. One could equally draw attention to national policy effectively requiring implementation of the RWMPs. Indeed, one might reasonably ask what the plans are for when facilities which are not consistent with them are pushed through by An Bord Pleanála anyway. The decision also places the Government in an interesting – potentially uncomfortable – situation. Any planning application for a controversial facility could be granted, following appeals, on the basis that it is 'national policy', thus over-riding any locally based approach to decision making, and placing the Government at the heart of any controversy associated with the making of such decisions.

It may also be noted that the ban on commercial waste disposal at the Kinsale landfill (to preserve space for domestic waste) has led to 28% of the county's material being exported to other regions for landfilling and 7% being exported for incineration.

FEHILY TIMONEY-LED

- The South East is intending to procure a thermal treatment facility (sized up to 210,000tpa) by 2009, construct in 2010 and commence operation by 2011:

'A Clients Representative was appointed in 2004 to procure an integrated waste management facility for the region. The authorities will continue to support and promote the waste treatment options.'

- In Wicklow, a similar line of argument is taken. The environmental analysis undertaken purports to show that thermal treatment options perform better from an environmental standpoint. Yet, the Plan argues, Wicklow is not of sufficient scale to have its own thermal facility, so this solution would rely upon the capacity becoming available from another County / Region.

- Kildare argues:

'Kildare does not have the overall waste quantities to generate the economies of scale required to make thermal treatment an option at this point. Thus, Scenario Two (b) and Three are not considered suitable.'

How the plans arrived at thermal treatment being the technology of choice should be investigated. It may be supposed (due to the absence of environmental analysis in most of the original RWMPs) that as time has gone on, the regions have employed Life Cycle Assessment (LCA) and other techniques as a means of justifying, *ex post*, an already formulated policy.

A generic LCA produced by RAMBOLL is presented in all those RWMPs revised by Fehily Timoney. Similar appendicised reports are presented in each of the Wicklow, Kildare and the South East Region Plans as a basis for making the decision regarding residual waste management. In these cases, the following waste management systems are investigated:

1. Recycling targets achieved with residual waste to landfill;
- 2a. Recycling targets achieved with residual waste to MBT and output to landfill;
- 2b. Recycling targets achieved with residual waste to MBT and output to thermal treatment;
3. Recycling targets achieved with residual waste to thermal treatment.

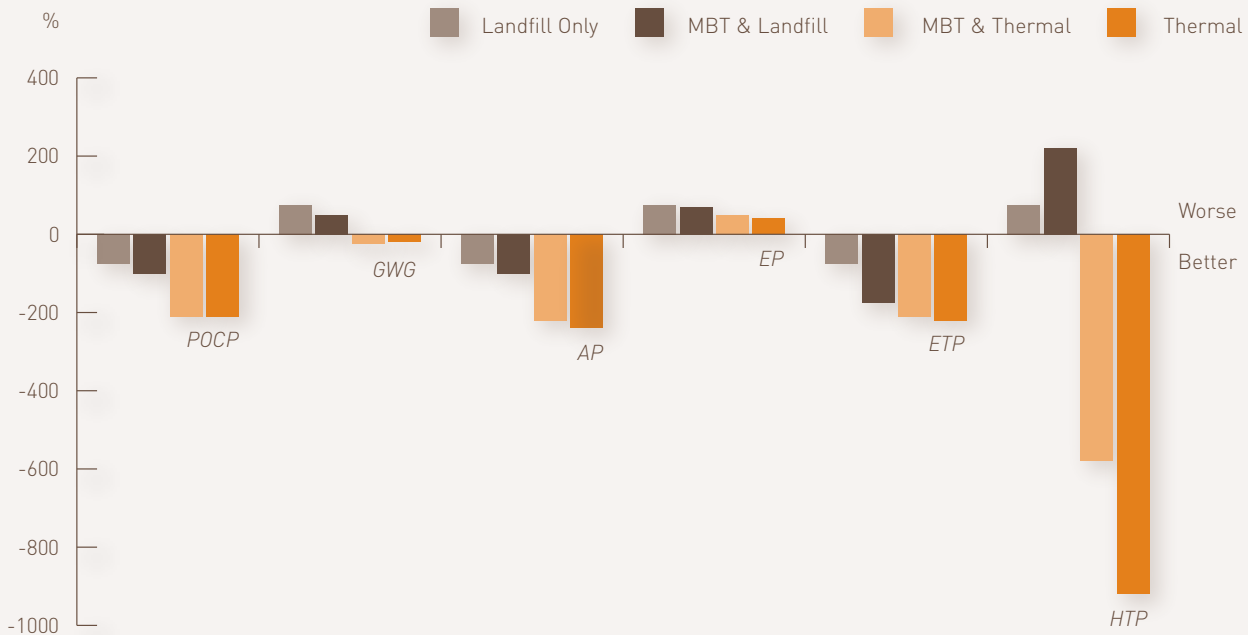
In other words, there is no assessment of the options for differing levels of waste recycling / composting or waste prevention. The emphasis is on the selection of 4 scenarios designed to tease out the difference in performance of four residual waste treatment options:

- Landfill of untreated waste;
- Use of MBT with landfill of biologically pre-treated waste;
- Use of MBT with residue being combusted in a thermal treatment facility;
- Thermal treatment.

The environmental assessment was carried out broadly following the LCA methodology as laid down in ISO 14040. The results of the analysis are shown in Figure 6. These appear to indicate that the 'Thermal' and 'MBT & Thermal' options fare best against all assessment criteria.



FIGURE 6: RESULTS OF COUNTY WICKLOW ENVIRONMENTAL ASSESSMENT



Source: Fehily Timoney & Company (2006) County Wicklow waste Management Plan Review 2005-2010: Proposed Plan, Appendices, February 2006.
 Note: POCP = photochemical ozone creation potential; GWG = global warming potential; AP = air acidification potential; EP = eutrophication potential; ETP = ecological toxicity potential; HTP = human toxicity potential

The underlying assumptions supporting the analysis are, however, contentious. A crucial assumption in such analyses is what one assumes to be the source of energy which is 'displaced' when energy is generated from waste. Early in the appendix, it is stated that:

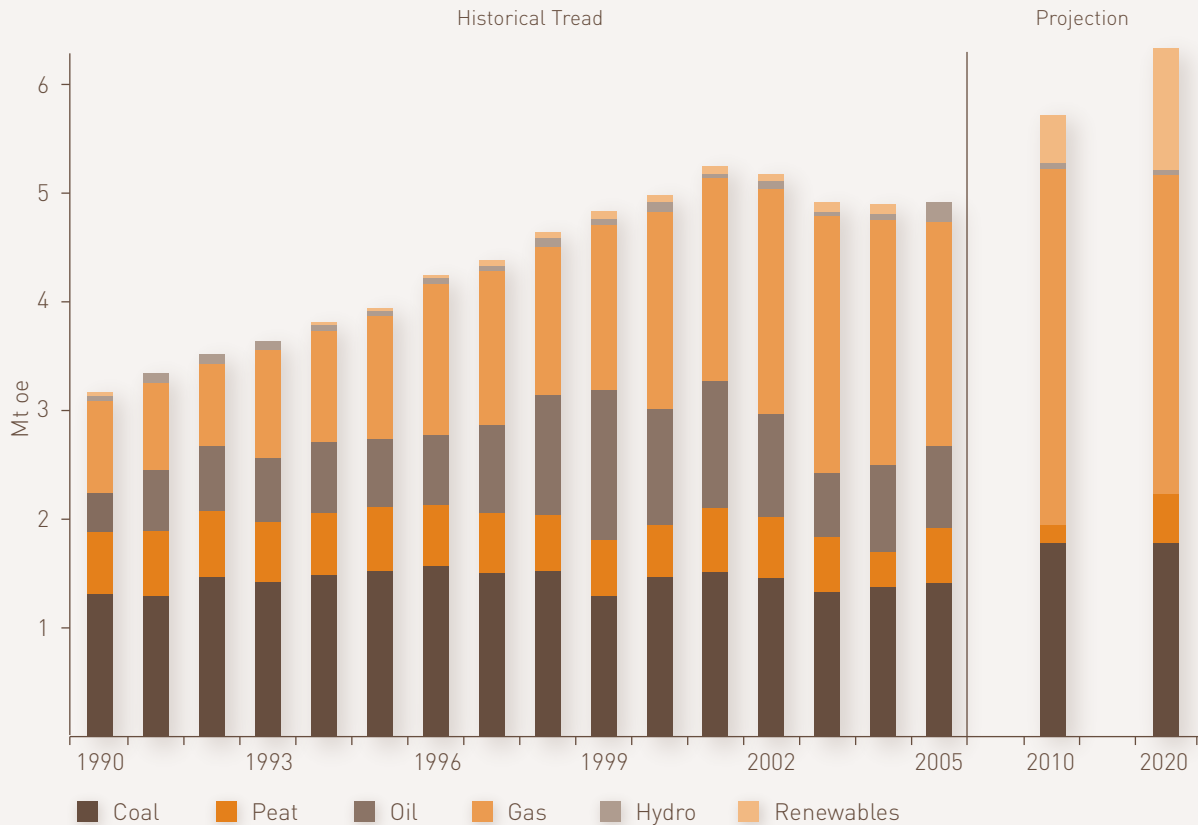
'Thermally treated waste and landfill gas can be used to generate electricity. These options are thus "credited" with the avoided emissions that would have resulted from the generation of an equivalent quantity of electricity in a coal burning power station.'

This is almost certainly an incorrect assumption, and biases the analysis in favour of energy recovery technologies.

A new energy from waste facility would, presumably, contribute to meeting what is (unfortunately) a growing demand for energy, and it would supply energy on a more or less continuous basis. A more correct assumption about the energy sources being 'displaced' (this being a difficult concept to sustain in the context of increasing demand) comes from a view as to how energy supply is likely to develop in coming years. The marginal power supply over the coming years in Ireland is almost certainly gas, or a mix of gas and renewables (as shown clearly by the expanding orange and peach bands in Figure 7). These marginal sources have lower emissions of GHGs and other pollutants associated with their generation than the average energy mix as it was at the time these studies were carried out (and it is changing all the time in Ireland), and far lower emissions than those from coal fired generation.



FIGURE 7: RESULTS OF COUNTY WICKLOW ENVIRONMENTAL ASSESSMENT



Source: SEI (2006) Energy in Ireland 1990 – 2005, November 2006

The increasing dependency on gas is reinforced in Eirgrid’s Generation Adequacy Report:⁶⁰

‘It can be reasonably assumed that much of Ireland’s Heavy Fuel Oil (HFO) powered generation capacity will close over the next seven years (ESB has announced that it intends to close Tarbert station - 590 MW of HFO powered capacity). ... The closure of such units could remove the ability to switch away from gas-fired generation for a sustained period of time. This is of particular concern as it may occur during a period when Ireland’s already heavy dependence on gas fired (mainly CCGT) plant increases further.’

The CO₂ intensity of electricity production in Ireland was 624g CO₂/kWh in 2004.⁶¹ Sustainable Energy Ireland predicts continuing growth in gas for electricity supply (up to 18,445 GWh in 2020 from

13,652 GWh 2005) with coal’s share increasing more marginally (from 5,447 to 6,149 GWh).⁶² Overall, demand is still increasing over time. So, the average CO₂ production/kWh is likely to be trending towards around 400g CO₂/kWh by the time any Irish incinerator is in its ‘mid-life’, with the marginal source already down at 400g CO₂, or below for efficient Combined Cycle Gas Turbine facilities.

If EfW functions at relatively high net electrical efficiency of 25% (relative to Net Calorific Value of waste input),⁶³ we would expect the CO₂ (equ) per kWh from an incinerator to be of the order (depending on waste composition, calorific value, fossil carbon content, etc.) 430g CO₂(equ) /kWh (fossil carbon only) or around 1,380 g CO₂(equ) /kWh (including biogenic sources of carbon).

This can be compared with (for electricity from fossil fuels) emissions from ‘displaced sources’ as follows:



- Ireland average 624g CO₂/kWh (source above)
- An estimate of 380g CO₂/kWh for gas, 750 g CO₂/kWh for oil, 850 g CO₂/kWh for coal.

Whether there is a net positive or negative impact depends on:

- composition of waste being delivered to the incinerator;
- what one assumes is being 'displaced' and the carbon intensity of generation.

If one accepts that the marginal source is gas, then incinerators would appear to be making net contributions to, not reducing, climate change emissions. This renders the basis for the analysis

by Fehily Timoney, as well as the statements from Forfas in particular, somewhat shaky.

Taking this further, in comparative analyses of residual waste treatments, for reasons we have elaborated elsewhere, it is methodologically incorrect to ignore the contribution to GHG emissions of non-fossil derived CO₂.⁶⁴ If, in comparative analyses of waste treatment options, the non-fossil-derived CO₂ is taken into account, then the comparative performance of different residual waste technologies (expressed in monetised GHG impacts, since the time-profile of emissions needs to be considered) looks like Figure 8 below if one assumes avoided electricity is gas, or like Figure 9 if the avoided electricity source is the Irish average.

FIGURE 8: GHG DAMAGE COSTS ASSOCIATED WITH DIFFERENT RESIDUAL WASTE FACILITIES, AVOIDED ENERGY SOURCE= GAS

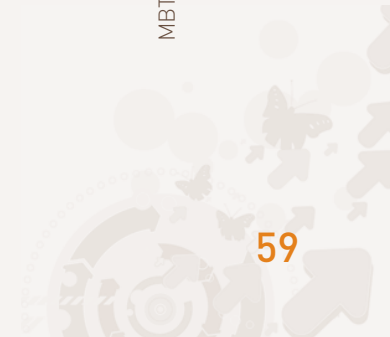
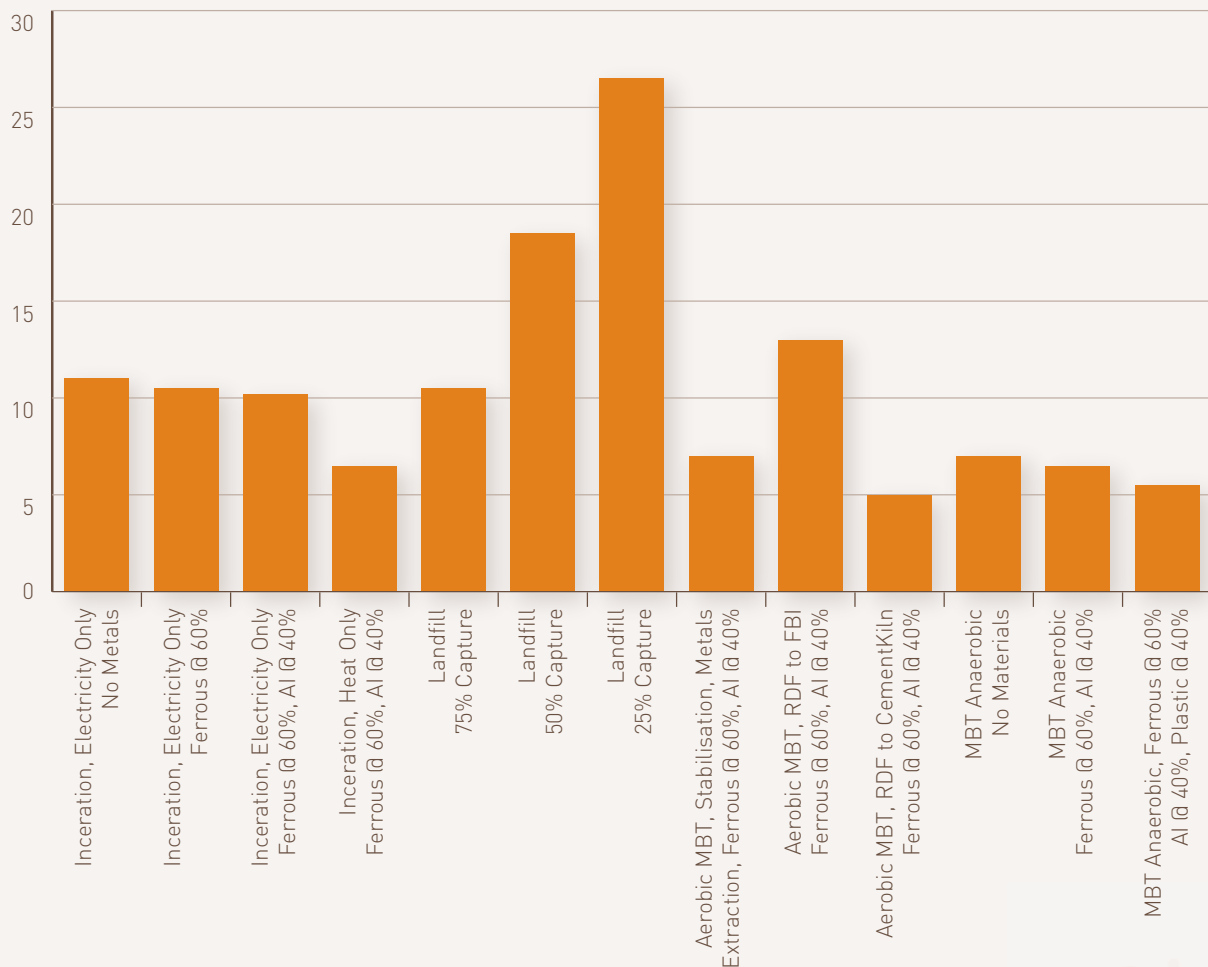
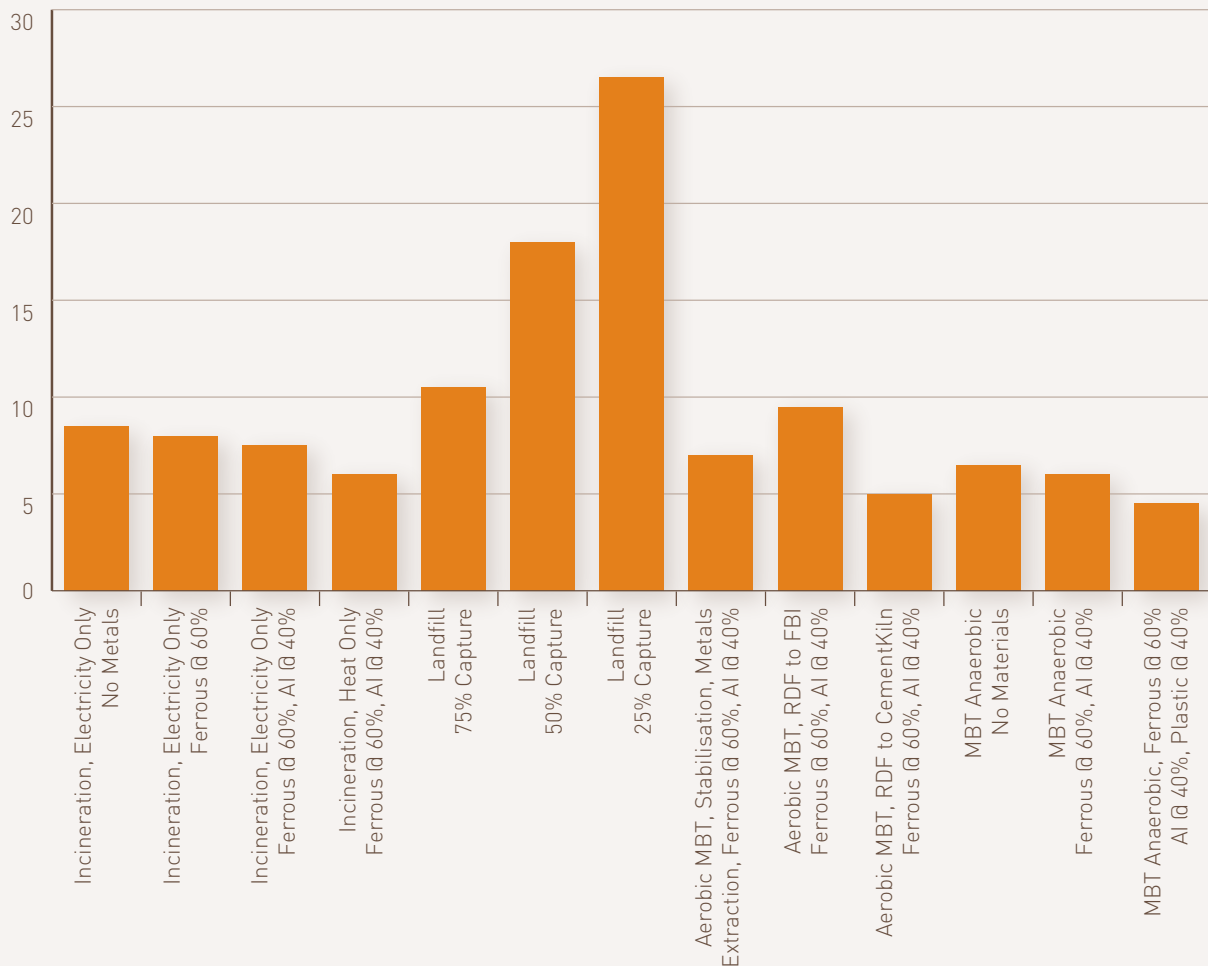


FIGURE 9: GHG DAMAGE COSTS ASSOCIATED WITH DIFFERENT RESIDUAL WASTE FACILITIES, AVOIDED ENERGY SOURCE = IRISH AVERAGE



The facilities generating more energy look relatively better as the CO₂ intensity of the avoided source is assumed to go up. However, it is not the case that those facilities generating most energy have the best overall performance in respect of climate change. The 'unreleased' greenhouse gases are important in the analysis, and so is the recovery of materials from the process.

In addition to this assumption, the Fehily Timoney LCAs are not at all transparent in respect of the data they use. Indeed, one source is our own work for Greenpeace, *Cool Waste Management*. It is not at all easy to see how the plant emissions of what is being modelled relate to the plant modelled in that report

(which was an aerobic and AD-based facility, aimed at stabilising material prior to landfilling). Nor is it clear how the performance of the landfill has been modelled where this receives pre-treated material. Finally, the assumptions are simply not clear in the analysis, with the exception of that related to avoided energy sources.

The RPS-led RWMPs also have a strong thermal flavour, largely to the exclusion of other technologies (which do not seem to have been modelled, or at least, not in the second generation of RWMPs – analysis may have been undertaken separately). The plan for the Midlands Region states:

'Following the assessment the Best Environmental Practicable Option (BEPO) – achieving maximum landfill diversion through maximum recycling and thermal treatment of combustible wastes – was selected for the Region.'

Generally, the RPS-led RWMPs do not seem to consider biological treatments in the modelling of alternative options. Typically, these plans investigate only three scenarios – 'maximum' (which is rarely clearly justified as a maximum) recycling and landfill, national target levels of recycling and incineration, and 'maximum' recycling and incineration. It barely needs a model to tell one which of these options emerges as the most favoured one, especially if one of the aims is to comply with the Landfill Directive. The modelling is all but made redundant.

Despite the preference given to thermal treatment in the plans, there has been surprisingly little development to procure facilities within the regions. The Limerick/Clare/Kerry plan highlights the high level of risk that will be seen in procurement. Sizing for their facility is suggested to be based on residual waste quantities between 174,000 to 193,000 tonnes in 2010, increasing to 248,000 to 277,000 tonnes in 2030. The plan states:

'It is assumed here that a reliable estimate for the quantity of waste that will need thermal treatment in the Limerick/Clare/Kerry Region, having due regard to future biodegradable waste treatment capacity and waste movements in and out of the Region is 150,000 - 200,000 tonnes per annum. The procurement process for a thermal waste treatment facility in the Region will quickly show how accurate this assumption is. This will be clearly shown in the level of risk to waste quantities perceived by potential bidders.'

Entering into the procurement process with an unknown capacity for the facility is a surprising strategy to pursue since this will cast serious doubt over the bankability of any proposed projects. However, the problems inherent in the waste projections (and even the achievable levels of recycling) make this a common problem across the regions.

A departure from 'the norm' in the RPS-led RWMPs is the Connaught RWMP. Here, it seems that there is a growing awareness that time is moving on, and a shortage of time is not a favourable situation to be in if one is seeking to divert material from landfill through incineration. Consequently, MBT appears in the RWMP as something of an afterthought, a last minute addition to the Plan to ensure that it can deliver what is required. Though the concept has been included, there is nothing in the financial modelling relating to MBT.

6.2 AN ALTERNATIVE VIEW

In the Section, some alternative views are presented in respect of the central role accorded to thermal treatment. We have focused on the following areas, since these have been the focus of arguments for thermal treatment:

- What other countries do, or have done;
- The waste management hierarchy;
- Health issues;
- Regulation for alternative treatments.

6.2.1 OTHER COUNTRIES

There is a common fallacy that, by looking at what a whole nation does (in terms of managing its waste through different routes), one can understand whether a particular treatment – in this case, incineration – 'crowds out' recycling. The national picture can give some indication of what happens, but national averages rarely reflect what is happening in specific local contexts.

There are extreme cases. The frequent assertion that in Denmark, a high recycling rate sits happily alongside a high rate of incineration, clearly belies a closer look at the data. If a country incinerates – to use Forfas' figures – 65% of municipal waste, it is unlikely to seek to be recycling much more than 30% of that waste stream, simply because it potentially compromises the fixed investments in incineration capacity (which, in Denmark, are principally local-authority owned). Exceptions to this rule would be where capacity freed up by increased recycling could be readily sold to other customers.

The Danish Waste Strategy for 2005-2008, published in 2004, shows that although some categories of waste – such as garden waste – are largely recycled, others – notably household waste and domestic waste – are largely incinerated (see Table 8).

The targets for recycling these fractions in 2008 are not especially ambitious, and appear to be held back by the fixed investments in incineration capacity.

TABLE 8: RECOVERY OF BMW FRACTIONS IN IRELAND, 2004

	Actual waste treatment 2001			Waste Strategy - aims for 2008		
	Recycling	Incineration	Landfilling	Recycling	Incineration	Landfilling
Household waste	29%	61%	8%	33%	60%	7%
Domestic waste	16%	81%	3%	20%	80%	0%
Bulky waste	18%	49%	26%	25%	50%	25%
Garden waste	99%	0%	1%	95%	5%	0%
Waste from institutions, trade and offices	36%	49%	12%	50%	45%	5%
Industry	65%	12%	22%	65%	20%	15%
Building and Construction	90%	2%	8%	90%	2%	8%
Sewage works	67%	27%	6%	50%	45%	5%
Power plants	99%	0%	1%	90%	-	10%
TOTAL	63%	25%	10%	65%	26%	9%

Source: Danish Waste Strategy for 2005-2008

More typically of countries where the 'average' suggests a comfortable co-existence, of incineration and recycling, the proportion of Germany's waste which is recycled or composted / digested varies significantly at the local level, being in excess of 70% in some municipalities, and well below the national average in some others. Referring back to the previous discussion regarding targets, typically, rural and suburban areas show the highest levels of performance, whilst densely populated urban areas may perform less well. It should be noted, however,

that performance is effectively becoming more even, not least since in some dense urban areas, the use of chamber systems for the purpose of operating pay-by-use schemes is generating incentives for those in high-rise buildings to perform at a similar level to those in single households.

It is true, as Davies suggests, that crowding out of recycling by incineration is not an automatic outcome.⁶⁵ For example, in Ghent, an incinerator sized mainly to deal with municipal waste has been

to used to treat growing quantities of commercial waste as progress in recycling has freed up capacity. The joint venture arrangement there allows sharing of the benefits across the authority and the private sector. Problems are more likely to arise, however, where, as in Ireland, forward projections are shaky, and targets for recycling have been established without clear reference to what might be possible today, let alone over the operating lifetime of an incinerator.

So what is a high recycling rate, and equivalently, what magnitude of residual waste treatment capacity – of any ‘fixed throughput’ type – might crowd out the potential to do more in terms of recycling?

Flanders (in Belgium) with 6 million inhabitants claims a separate collection rate of 70% for household waste today. It may be that not all of this is actually recycled (though there would be the potential to do so). The rate was around 62% at the turn of the decade so this is still increasing from already high levels. Leading municipalities in Italy, Germany and Austria, all show recycling rates for household waste of the order 70% and above.

Major cities do not generally perform so well, though leading cities are nudging 50% today. Davies shows how in Nord Rhein Westfalen, where the average rate of recycling was 45%, the rural areas were rarely below 50% recycling, with highest performers achieving 65%. Urban areas, however, ranged in performance from 25% to 45%.⁶⁶

Recycling rates are not static. It is worth reflecting on how far leading authorities and nations have come over the last 15-20 years (a typical operating period for an incinerator). If one was to have surveyed performance levels 15 years ago, a very different picture would have emerged. Flanders was recycling around 18% of its waste in the early 1990s. Rather fewer municipalities than today would have been achieving recycling rates greater than 15%. The point here is that recycling rates show no ‘maximum’ because the picture is continuously evolving, and the frontier of achievement is trending upwards. This suggests that, before entering into contracts for residual waste treatments, local authorities and regions might do well to consider where they wish to be not today, but ten to fifteen

years hence. Flexibility within the strategy ‘to do more’ would be desirable.

Recycling rates do not tell the whole story. Particularly in the case of household waste, the quantity of material entering the collection system is affected by the nature of the collection system, especially whether garden waste collections have a zero marginal cost to the user. Consequently, a better indicator of performance in household waste systems is probably the amount of residual waste which is collected per household, or per inhabitant. Flanders has used such a target – of 150kg per inhabitant per year – to drive up performance in respect of source separation and waste prevention, with widespread pay-by-use being a key tool.

The discussion suggests that in much of Ireland, where there are few major cities, the potential for recycling rates to increase is significant, assuming that some of the issues in respect of household waste collections can be addressed. Equivalently, the quantity of residual waste requiring treatment or disposal has the potential to be a relatively small fraction of the total. This fact, combined with the somewhat awkward nature of growth projections and target setting in the RWMPs, leads one to believe that the potential for incineration to crowd out recycling is real in some areas, especially where targets for ‘energy recovery’ are set in excess of 30% of the *total* (i.e. household plus commercial plus industrial) waste stream. In short, from being in a situation which Forfas describes as ‘critically lacking’ in thermal treatment capacity, if the capacity in the RWMPs was to be instated, Ireland would be at risk of over-specifying capacity for thermal treatment.

To illustrate the point, on the basis of 150 kg/inh residual waste, a facility of capacity up to 600,000 tonnes per annum, as proposed in Poolbeg, would be sufficient to deal with household waste from 4 million inhabitants. The population within the City of Dublin (i.e. the administrative area controlled by Dublin City Council) was 505,739 at the census of 2006. Beyond this, at the same census the Dublin Region population was 1,186,159 whilst the Greater Dublin Area had a figure of 1,661,185. From the Central Statistics Office Ireland, Ireland’s population was 3.9 million in 2002, estimated at 4.2 million in 2006. 600,000 tonnes per annum capacity would be

sufficient for, essentially, nearly all household waste in the Republic under a state of the art collection system.⁶⁷

This clearly has implications for, for example, the ongoing consultation around the need, or otherwise, for a regulator, and the possible function of controlling flows of waste into a treatment plant. At such capacities, then if recycling of household waste continues to develop in Ireland, and begins to match the performance of recycling in the commercial and industrial stream, the 'reach' of flow control regulation would potentially become enormous. The costs of transporting material to the facility would negate any economies of scale at the facility itself. It is difficult to see why, if local authorities have been involved in guaranteeing supply of material to such facilities, the recycling systems for household waste would be developed as quickly as they might otherwise be, especially if 'put-or-pay' type contractual clauses effectively penalise the authorities for better recycling performance.

This is also interesting in the context of the development of a proposed new landfill in Nevitt in the Dublin Region. This is a public private partnership (PPP) project and occurs in the context of the fact that in 2004, no domestic waste landfill capacity was anticipated to be available in the Dublin region after the end of 2007. The new landfill would effectively give the local authorities considerable power in the market for waste disposal in the region. Interesting questions are likely to arise once the Poolbeg incinerator becomes operational. The local authorities in the region would effectively become dominant players in waste disposal in the Region.

The vast majority of the discussion which has occurred in Ireland ignores the role of MBT in other countries' waste management strategies. As mentioned above, in Italy, for example, the National Environmental Protection Agency estimates the capacity of MBT facilities at around 10 million tonnes. Large facilities have been constructed in Spain, Holland, Italy, Portugal and the UK, whilst over 50 facilities exist in Germany and Austria. This is clearly not a trivial development.

6.2.2 THE HIERARCHY

Part of the case for incineration appears to have been based around the waste hierarchy. The waste hierarchy has always had its supporters and its

detractors. The merit of the hierarchy is that it simplifies decision-making. Another feature of the hierarchy is that, in general, the ranking appears to be reasonably well-aligned with the perspective of the public.

All levels of the hierarchy have been commented on in some shape or form in recent years. However, the lower rungs on the ladder – energy recovery and disposal – have been the subject of some particularly interesting comment.⁶⁸

In 2003, rulings in the European Court of Justice (ECJ) effectively ruled that incineration should be re-classified as disposal with some limited exceptions.⁶⁹ The argument of the ECJ effectively held that the term 'recovery' applied only to activities where there was genuine displacement of other resources (such as where refuse derived fuel was burned in a power station which would otherwise have been powered by coal). The argument that incinerators could 'displace' emissions from fossil-fuel powered facilities located elsewhere was effectively rendered meaningless for the purposes of the distinction between disposal and recovery. If, on the other hand, waste was being used as a fuel at a power plant, or kiln, or other co-incineration facility, then by virtue of the waste displacing fuel at the facility itself, that would be deemed to fall within the recovery definition. Some incineration plants – notably, those where waste was used to power district heating systems which would need to be powered by some fuel in the absence of the facility – could be classified as recovery. But in essence, facilities whose principal purpose was the treatment of waste would no longer be classified as 'recovery' operations simply because they happened to generate energy.

In making this ruling, the ECJ effectively placed incineration, other than in exceptional circumstances, on the same rung of the hierarchy – disposal – as landfill. There was clearly some logic to this. Modern landfills recover energy from waste where this is deposited in untreated form. Indeed, the Landfill Directive requires all landfills receiving biodegradable waste to be equipped with gas collection systems, *'and the landfill gas must be treated and used. If the gas cannot be used to produce energy, it must be flared.'*⁷⁰ The majority of larger landfills in Ireland are currently capturing landfill gas for electricity generation.

As regards 'incineration' (including pyrolysis, gasification, etc.), the Incineration Directive requires that:

'the heat generated during the incineration and co-incineration process is recovered as far as practicable e.g. through combined heat and power, the generating of process steam or district heating.'

In other words, neither landfills which accept biodegradable waste, nor incinerators, can legally operate any more without seeking to generate energy. Both are, therefore, 'energy from waste' facilities. Why should one be 'recovery', the other 'disposal'?

The lack of recognition in Irish policy documents of what is 'the law' is somewhat surprising. Policy documents continued (and do so today) to discuss incineration under the heading 'recovery' after this ruling. In a letter from Margot Wallstrom in May 2003, published as Appendix 4 to a Consultation Paper on Changes to the Packaging Regulations in the UK, the Commission notes:⁷¹

'The European Court of Justice has decided in its judgement in case C-458/00 that the primary objective of incineration in a dedicated municipal waste incinerator is waste disposal. The Court added that this classification as a disposal operation is not changed if, as a secondary effect of the process, energy is generated and used.'

The consequence of the Court Decision is that the definition of the recovery target provided for in Article 6 of the Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging³⁰ waste should be interpreted as follows:

The word recovery is defined in Directive 94/62/EC as any of the applicable operations provided for in Annex IIB to Directive 75/442/EEC. The Court's judgement in case C-458/00 has by applying the concept of the primary objective of the operation excluded dedicated incineration in municipal incinerators from this list of operations.

Energy recovery defined as 'the use of combustible packaging waste as a means to generate energy through direct incineration with or without other waste and with recovery of the heat' is excluded from the concept of recycling as it is defined in Directive 94/62/EC.

On this basis, to achieve the overall recovery target, Member States have either to increase recycling or to recover energy from the combustible fraction of the packaging waste stream through co-incineration in cement kilns or power plants, which have been recognised by the Court as recovery operations (Law case C-228/00, judgement 13 February 2003).' (our emphasis)

From the perspective of European law, therefore, incineration is disposal.

6.2.2.1 THE PROPOSED WASTE FRAMEWORK DIRECTIVE AND THE DEFINITION OF RECOVERY

Recently, much discussion within Europe, has centred on the Commission's Proposals for a Thematic Strategy on Waste Prevention and Recycling, and for a Waste Framework Directive. In particular, the issue of what should be defined as 'recovery' and what should be defined as 'disposal' has become a hot issue.

It is important to note that there appears to be some acceptance, even now, that incinerators linked to district heating schemes can be regarded as recovery facilities since the absence of the incinerator would, most likely, imply the need for a different energy source to be combusted to serve the district heating scheme. Consequently, even the existing distinction appears to allow incinerators, under certain conditions, to be considered as 'recovery' facilities.⁷²

The Proposal for the Thematic Strategy introduces the Commission's approach thus:

'The Commission is proposing an amendment to the Waste Framework Directive to include an energy efficiency threshold above which municipal incineration is considered a recovery operation. The threshold takes BAT as guidance and takes into account the recommendation

in the BREF (BAT reference document) on waste incineration to use an equivalence factor of 2.6 to compare energy in the form of electricity to energy in the form of heat, i.e. 1 kWh of electricity is equivalent to 2.6 kWh of heat, and a factor of 1.1 for district heating.’⁷³

Consequently, in Annex II of the initial proposal for the WFD, the following criteria was proposed for drawing the distinction between ‘recovery’ and ‘disposal’:

‘Use principally as a fuel or other means to generate energy.

This includes incineration facilities dedicated to the processing of municipal solid waste only where their energy efficiency is equal to or above:

- *0.60 for installations in operation and permitted in accordance with applicable Community legislation before 1 January 2009,*
- *0.65 for installations permitted after 31 December 2008,*

using the following formula:

Energy efficiency = $(E_p - (E_f + E_i)) / (0.97 \times (E_w + E_f))$

In which:

E_p means annual energy produced as heat or electricity. It is calculated with energy in the form of electricity being multiplied by 2.6 and heat produced for commercial use multiplied by 1.1 (GJ/year)

E_f means annual energy input to the system from fuels contributing to the production of steam (GJ/year)

E_w means annual energy contained in the treated waste calculated using the lower net calorific value of the waste (GJ/year)

E_i means annual energy imported excluding E_w and E_f (GJ/year)

0.97 is a factor accounting for energy losses due to bottom ash and radiation.’

There are a number of problems with this approach:⁷⁴

1. As already discussed, the Waste Incineration Directive (which preceded the ECJ rulings) itself states, at Article 4(2) (*‘Application and permit’*) that:

‘Without prejudice to Directive 96/61/EC, the application for a permit for an incineration or co-incineration plant to the competent authority shall include a description of the measures which are envisaged to guarantee that:

(a) the plant is designed, equipped and will be operated in such a manner that the requirements of this Directive are taking into account the categories of waste to be incinerated;

(b) the heat generated during the incineration and co-incineration process is recovered as far as practicable e.g. through combined heat and power, the generating of process steam or district heating;

and at Article 6(6) (operating conditions), that

Any heat generated by the incineration or co-incineration process shall be recovered as far as practicable.’ (our emphasis)

The proposal for the Thematic Strategy had as one of its aims, an improvement in the implementation of existing legislation. To the extent that the Commission saw fit to distinguish between ‘disposal incinerators’ and ‘recovery incinerators’ on the basis of energy efficiency, one might argue that the rationale for such a distinction is founded upon the basic fact that implementation of the Waste Incineration Directive needs to be improved;

2. Notwithstanding the issue that these Articles are not being as closely enforced as they might be, it is clear that incinerators should not be allowed to operate unless they are being as efficient as is ‘practicable’. Drawing a distinction between ‘recovery’ and ‘disposal’ on the basis of efficiency would imply, therefore, distinguishing between those incinerators where high levels of efficiency ‘are practicable’ and those where they are not. It is less than clear that this should be seen as an appropriate

basis for distinguishing 'recovery' from 'disposal', not least since meeting the Commission's efficiency threshold might imply lower efficiencies than what is 'practicable', leading to the absurd position that a theoretical incinerator could, on the one hand, meet the Commission's efficiency threshold which ensured that it could be defined as 'recovery', even though it was not allowed to operate because it was not recovering heat as far as was practicable; and

3. The Proposal for the Thematic Strategy notes that the efficiency criteria 'takes BAT as Guidance' for the threshold level. Yet incinerators require a PPC permit to operate, and in order to acquire that permit, they ought to demonstrate BAT. So, it is not clear how this efficiency threshold effectively distinguishes between 'recovery' incinerators and 'disposal' ones, since all the disposal ones, by virtue of not demonstrating BAT, should not be operating. In order to operate, the plant must demonstrate BAT. If the Commission is simply re-iterating what is BAT, then in reality, the position it will come to is that all incinerators which are allowed to operate are 'recovery ones'. This is not a means of distinguishing one thing from another. It effectively implies a complete reversal of the decision of the European Court.

To further highlight these points, it is perhaps worth considering the position of an incineration plant where the desire was to 'become' recovery rather than disposal through increasing the efficiency of energy generation as measured through the equation set out in Annex II of the WFD as first proposed. The act of making such improvements suggests improvement was possible, one might say, 'practicable'. Consequently, these might have been considered requirements of the Directive, not to mention a PPC permit. Accepting that incinerators cannot permanently operate at the 'frontier of efficiency' because of the lifetime of investments involved, efficiency improvements made 'well within' that frontier ought, arguably, already to have been in place. Consequently, the idea that any incinerator is about to radically alter its energy generation configuration as a consequence of the definition is unlikely. These investments will typically be made at the planning stage, or where there is a complete retrofit, and will be heavily influenced by relative prices of heat and electricity, though properly, for reasons highlighted above, they ought to be more

significantly influenced than they are by the attitudes of the regulators towards the use of the heat being generated, and this should, in turn, influence the location of sites.

An interesting consequence of the debate has been that representatives of the incinerator industry moved to reduce the efficiency threshold from 0.6 to 0.5 (and proposals from France suggested even lower efficiencies). CEWEP responded to the Directive by stating that:⁷⁵

'However, the energy efficiency factor of 0.6, which is proposed in Annex II (R1 formula), is too high. The factor 0.5 would be absolutely sufficient and ambitious enough for the WtE sector.'

This is interesting, not least since the criteria which would need to be met would be achieved by plants generating electricity as long as their net electrical efficiencies exceeded a figure of 19% or so (as opposed to 22-23% in the initial proposal). Probably, it also reveals that many publicly quoted efficiencies of electricity generation in various studies are above levels that are, in practice, achieved.

Similarly, FEAD (the European Federation of Waste Management and Environmental Services) set out its position:⁷⁶

'FEAD supports the fact that municipal waste incinerators may be considered as recovery operations and that this status is determined by a criterion based on energy efficiency. However, FEAD requires that this criterion is accessible under the conditions prevailing in all EU Member States.'

The proposed formula must be easy to apply and acceptable from a thermodynamics point of view. Moreover, it should take into account different local conditions without discriminating between the North and South of Europe and without discriminating more advanced flue gas treatment installations (i.e. leading to lower emissions).

Therefore, FEAD advocates for a simplified formula and threshold based on the energy efficiency performances which are achievable when using the Best Available Techniques (as

given in Chapter 5 of the Waste-Incineration BREF). FEAD proposes to use a formula effectively based on the Waste-Incineration BREF which compares the effectively used energy (export and self demand, i.e. what is actually a substitution of resources) to the energy of waste.

The demands on energy efficiency must be fulfilled by all types of plants incinerating waste and not only to facilities dedicated to the processing of municipal solid waste.'

As well as making some salient remarks related to the trade off between flue gas cleaning and energy efficiency, it essentially argues for the use of the BREF figures for efficiency. The BREF note proposes, for municipal waste incinerators (in Chapter 5), the following measures:⁷⁷

61. The location of new installations so that the use of CHP and / or the heat and/or steam utilization can be maximized, so as to generally exceed an overall total energy export level of 1.9 MWh per tonne of MSW based on an average NCV of 2.9 MWh per tonne

62. in situations where less than one 1.9 MWh per tonne of MSW (based on average NCV of 2.9 MWh per tonne) can be exported, the greater of;

- a. the generation of an annual average of 0.4-0.65 MWh electricity per tonne of MSW (based on an average NCV of 2.9 MWh per tonne processed, with additional heat/steam supply as far as practicable in the local circumstances, or*
- b. the generation of at least the same amount of electricity from the waste as the annual average electricity demand of the entire installation including (where used) on-site waste pretreatment and on-site residue management operations*

63. to reduce average installation electrical demand (excluding pretreatment or residue treatment) to be generally below more 0.15 MWh per tonne of MSW processed and based on an average NCV of 2.9 MWh per tonne of MSW.⁷⁸

It is clear that the incineration BREF note lists ranges of efficiency. The fact remains that in order to operate, an incinerator must have a permit and must demonstrate BAT. It seems meaningless, therefore, to propose, as a means to distinguish recovery facilities from disposal facilities, a criterion with which all facilities have to comply anyway.

At the end of November, the Parliament voted to reject the idea of a formula for distinguishing between incinerators which are recovery, and those which are disposal. Furthermore, a 'flattened hierarchy' proposed by the Germans was rejected. Instead, a five-step hierarchy was proposed which now looks as follows (in a new Article 7a):

- a) Prevention;
- b) Preparing for re-use;
- c) Recycling;
- d) Other forms of recovery;
- e) Disposal

Initially, the debate about the classification of incineration as disposal or recovery was made all the more important because Article 5(1) of the Commission's initial proposal stated:

'Member States shall take the necessary measures to ensure that all waste undergoes operations that result in it serving a useful purpose in replacing, whether in the plant or in the wider economy, other resources which would have been used to fulfil that function, or in it being prepared for such a use, hereinafter "recovery operations". They shall regard as recovery operations at least the operations listed in Annex II.'

As discussed above, currently, following the rulings of the European Court of Justice, incineration of waste is classified as disposal. The Commission has expressed concern about this because of the implications for meeting targets for recovery set in certain Directives (notably the Packaging Directive), even though the wording of the revised Packaging Directive was changed so that targets no longer apply to 'recovery' alone. Instead, they refer to the need for packaging to be 'recovered or incinerated at waste incineration plants with energy recovery'.⁷⁹ Probably as important has been the fact that the German Lander are known to have interpreted

the ECJ ruling in different ways, and in seeking a resolution to the matter, the issue has been pushed up to the European level.

The significance of the initial proposal for Article 5(1) was that for incinerator operators / technology providers, the distinction between recovery and disposal was no longer 'simply' one of being 'in' or 'out' of some targets (which themselves could have been amended). Article 5(1) raised the stakes by requiring Member States to take necessary measures to ensure all waste was recovered, rather than being sent for disposal. Evidently, if incinerators continued to be classified as disposal, the implications of the Commission's proposed Article 5(1) would appear to have been that measures which encouraged incineration would, at the very least, be scrutinized more closely, and that incineration would not be one of the treatments which Member States would have to take measures to ensure were being used to treat waste. Given this, it seemed likely that if an agreement could not be reached on the conditions under which incinerators would be classified as recovery (see below), then the wording of Article 5(1) would need to change (not least because of the Commission's apparent desire to see the ECJ rulings reversed, or watered down).

This is indeed what has happened. Article 5 appears to have been replaced by a new Article 9, which refers to the need to ensure waste management is carried out in line with Articles 7 and 7a, the latter being a reinstatement of the hierarchy, with recycling placed above recovery. Annex 2 regarding recovery operations includes amended text and no reference to the efficiency formula distinguishing 'recovery incinerators from disposal ones, though some Member States consider the formula important, and the Commission still considers it essential. Instead, Article 19 simply states that where waste is treated by incineration or co-incineration, it must take place with a high level of energy efficiency.⁸⁰

It may be that Article 19 will subsequently give greater substance to what is set out in the Waste Incineration Directive, with a requirement to achieve minimum efficiencies (as measured by the formula previously used to distinguish between recovery and disposal) rising over time from 0.4 to 0.5 to 0.6. This, however, does not imply that incinerators meeting

such standards would be classified as recovery facilities.

Fundamentally, there must be questions raised about the wisdom of seeking to set a distinction between recovery and disposal based upon energy efficiency criteria (why not do the same for a landfill which captures methane for energy generation? Would that signal 'the death of disposal'?). The reason for adopting this view is quite straightforward – existing legislation, the Incineration Directive and the IPPC Directive – effectively requires measures to be taken at incinerators to make use of heat 'as far as is practicable' as a condition of their being allowed to operate at all.

6.2.3 HEALTH, CLIMATE CHANGE AND DISAMENITY

The generally held view is that 'landfill is worse than incineration', and this view is widely stated in Irish policy documents, as we have seen. Irish policy documents refer both to climate change benefits, and the low level of health impacts, this frequently focusing on persistent pollutants and links to carcinogenicity.

The analysis of costs and benefits associated with residual waste treatment options is a subject which has been discussed in a range of studies. Many of these look not just at landfill and incineration, but at other treatments as well.⁸¹ The view that 'landfill is worse than incineration' is, interestingly, certainly not the position of all studies, including some recent ones.

A comparative assessment of the performance of different waste treatments is always contingent upon a variety of assumptions made in the analysis. A number of countries – including the UK, and the United States – posit high rates of capture of landfill gas at modern facilities. The effect of positing such high captures is to render the usual argument against landfills – that they release significant quantities of methane to the atmosphere – redundant. If methane is captured effectively, and is used for energy generation, then methane generation becomes a good, not a bad thing (since it can be used to generate energy, and is converted into a less potent greenhouse gas – carbon dioxide – in the process).

Another key assumption (as highlighted in Section 6.1.2) is the source of energy one assumes is being displaced. The 'dirtier' that source, the better will the technologies generating energy appear. We have discussed this above in respect of climate change impacts. The same assumption is also important in respect of health impacts, however. Although much discussion on the health impacts of incineration focuses on the persistent pollutants and carcinogens, most cost-benefit studies find the principal impacts coming from 'classical' air pollutants – oxides of nitrogen (NO_x), sulphur oxides (SO_x), and particulate matter (PM).

That is not to trivialise the potential impact of dioxin emissions and the like. There remain considerable gaps in our knowledge of the environmental impacts of waste management options, and even where the knowledge is 'emergent', straightforward approaches to valuing benefits or costs rarely exist. Some of the uncertainties involved in this kind of analysis are highlighted in the conclusions of a recent Danish study, which noted, regarding dioxins from incineration:

'The American Environmental Protection Agency put out a draft version of a report from a very thorough dioxin study in 2000 (US-EPA, 2000). This study includes a dose-response model of the relationship between dioxin and cancer mortality. This model and Danish emission and intake data are used in the present report to estimate the socioeconomic costs of dioxin emission from waste incineration in Denmark and it is estimated that these costs are about 13 DKK pr. ton of waste (the uncertainty range is 1-128 DKK/ton). This indicates that dioxin may not be one of the most important kinds of emission from a socioeconomic point of view. Even though dioxins can cause major health problems, the emissions are so limited (6,4-28,9 g pr. year) that the economic damages are probably relatively small.

Considering the large number of uncertainties, the estimate of 13 DKK pr. ton has to be looked upon as an example of calculation rather than an exact price that can be used directly in economic valuation studies or cost/benefit analyses. One of the major problems of this estimate is that the dose-response model ascribes a very high risk to dioxins. On the other hand, the estimate excludes

*all morbidity effects and potential damages on the environment. Consequently, it is not possible to assess whether 13 DKK pr. ton is a high or a low estimate.'*⁸²

The range of damages referred to equate to a range from around €1.30 to €16.00 per tonne of waste incinerated. Considering both the scientific uncertainties in the estimation of impacts, and the unresolved methodological issues which affect valuation techniques, such ranges should be considered quite normal.⁸³

In the UK recently, a study (the Health Effects study) was carried out assessing the health effects of waste management options (and this study has been cited in Irish documents in support of the argument that there are no meaningful health impacts from waste management options).⁸⁴ The Health Effects study led to a piece of work looking at the external costs and benefits from landfill and incineration.⁸⁵ This work was then carried forward by HM Customs & Excise to look at the environmental costs and benefits of the options.⁸⁶ The results of the study are shown in Table 9. They show that the net environmental costs were lower for landfills than for incinerators.

Interestingly, this work definitely under-estimated the damages associated with incineration for one reason, and probably did so for another. First of all, there appear to have been basic multiplication errors in the HM Customs & Excise calculation. Second, the unit damage costs used in the calculation of environmental impacts appear to have been rather low. Certainly, work undertaken in the context of the Clean Air for Europe (CAFÉ) programme has estimated much higher unit damage costs for the pollutants of concern than were estimated in the UK work largely because the UK work made use of older dose response relationships than were used in the CAFÉ work.⁸⁷

TABLE 9: EXTERNALITIES AS REPORTED BY HM C&E FOR CENTRAL HIGH SCENARIO

Externality	Incineration with Energy Recovery	Landfill (medium) – Gas Flared	Landfill (medium) – Gas Used to Generate Electricity
Costs	-£19.11	-£9.83	-£12.04
of which:			
CO2	-£19.09	-£3.82	-£5.73
CH4	-£0.01	-£5.99	-£6.30
VOCs	-£0.00	-£0.00	-£0.00
SO2	-£0.01	-£0.02	-£0.01
Health	-£0.01	-£0.00	-£0.00
Benefits	£6.16	n/a	£2.15
Net Costs	-£12.95	-£9.83	-£9.89

Source: HM Customs & Excise (2004) Combining the Government's Two Health and Environment Studies to Calculate Estimates for the External Costs of Landfill and Incineration, December 2004.

We have calculated the externalities from landfill and incineration using the following approach:

- Emissions from the UK Health Effects report for incineration and landfill. We have reduced the level of NO_x emissions from incineration a relatively high level of 1.5kg per tonne (approx 300mg/Nm³) of waste (quoted in the study – no UK incinerator yet deploys selective catalytic reduction to abate emissions of NO_x) to 0.5kg per tonne of waste (half the permitted emissions level under the Waste Incineration Directive);
- For offsets associated with energy generation, we have used the figures shown in Table 10 for emissions per kWh of electricity generated by gas fired electricity. These are based on calculations (reflecting recent gains in efficiency) and published data in the UK's National Atmospheric Emissions Inventory. We were not able to find a figure for the efficiency of CCGT generating stations in Ireland. The figures are based upon generation at 40% efficiency, which is the UK average, and below the highest efficiency achieved;

TABLE 10: EMISSIONS PER KWH OF ELECTRICITY GENERATED FROM NATURAL GAS (G/KWH)

Carbon Dioxide	390.00
Nitrous Oxide	0.022
Particulate Matter	0.0822
Methane	0.55
NO _x	0.741
SO _x	0.132
VOCs	0.0365

- We have calculated the monetized damages using the CAFÉ unit damage costs for Ireland (in general, these are slightly lower than for the UK).⁹⁰ We have also applied this approach to calculate avoided damages associated with energy generation. Where greenhouse gases are concerned, for simplicity, we have taken gross emissions and assumed marginal damage costs in line with recent work in the UK on the social costs of carbon. We have

taken a figure for the latter half of this decade of €65/tonne of carbon, and have assumed that methane and nitrous oxide are 21 and 310 times more damaging than carbon dioxide;

- Energy generation estimates are figures for net delivery by the plant. For incinerators, we have used a figure of 25% (as above), a relatively high efficiency (we have assumed a net calorific value of 9.5MJ/kg of input waste, giving a net delivery of electricity of 660kWh/tonne, a very high figure, and higher than that assumed in the health effects report). For landfills, we have assumed generation of 150kWh/tonne

(this is lower than the figure assumed in Appendix 3 of the health effects report).

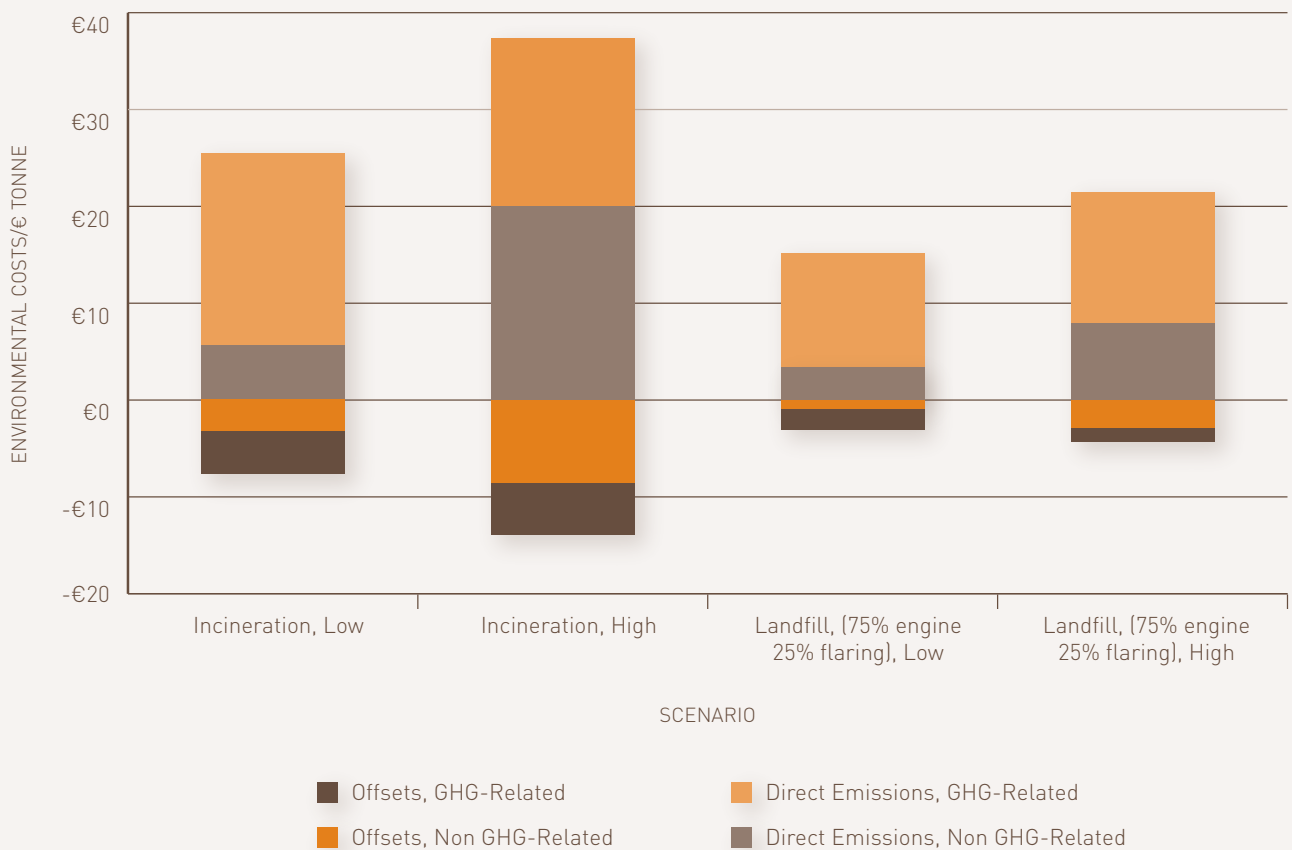
The results of the analysis are shown in Figure 10 and Table 11. The former shows the contribution from the process itself, and from the offsets, to the overall damages. It shows how the impacts of direct emissions from incineration exceed those from landfill. It also shows that the offsets are greater for incineration than for landfill. However, as Table 11 shows, these greater offsets are not so great that they compensate for the greater direct damages from incineration.

TABLE 11: EXTERNALITIES FROM LANDFILL AND INCINERATION (€/TONNE)

	Incineration, Low	Incineration, High Low	Landfill (75% engine, 25% flaring), Low	Landfill (75% engine, 25% flaring), High
Direct Emissions, Non GHG-related	€ 6.86	€ 19.80	€ 2.92	€ 8.46
Direct Emissions, GHG-related	€ 17.73	€ 17.73	€ 12.76	€ 12.76
Offsets, Non GHG-related	-€ 3.11	-€ 8.92	-€ 0.71	-€ 2.03
Offsets, GHG-related	-€ 4.78	-€ 4.78	-€ 1.09	-€ 1.09
Net Environmental Damages	€ 16.71	€ 23.84	€ 13.89	€ 18.11



FIGURE 10: CONTRIBUTIONS TO DIRECT ENVIRONMENTAL DAMAGES, AND ASSOCIATED OFFSETS, LANDFILL AND INCINERATION (€/TONNE)



This finding – that the external costs of landfill may be less than those of incineration – is not unique to this study. Our analysis does not, of course, tell the whole story. However, it should be added that it does not tell the whole story for either landfill or incineration where health impacts are concerned. Even so, the non-GHG-related damages in Table 11 are almost exclusively those related to health impacts. It can be seen that these are somewhat distant from zero and that it does not make sense to argue that waste management facilities – landfills, incinerators, or anything else – have no impacts on human health. The evidence simply does not support this view.

Two Dutch studies carried out recently make interesting reading. The first, by Dijkgraaf and Vollebergh, suggested that on a cost benefit basis, landfill was rather superior to incineration but principally on the basis of its lower cost.⁹¹ However, inspection of the results (see Table 12) shows a number of things:



TABLE 12: EXTERNAL AND PRIVATE COSTS OF LANDFILLING AND INCINERATION IN THE NETHERLANDS (ALL FIGURES IN € PER TONNE)

	Landfilling	Incineration
Gross Environmental costs:		
- Emissions to air	5.84	17.26
- Emissions to water	0.00	0.00
- Chemical waste	2.63	28.69
- Land use	17.88	0.00
Total	26.35	45.95
Environmental cost savings:		
- Energy function	4.21	22.55
- Materials function	0.00	5.76
Net environmental costs	22.14	17.64
Net private costs	36	79
Balance of private and environmental costs	58.14	96.64

Source: Dijkgraaf, E., and H. Vollebergh (2004) Burn or Bury? A Social Cost Comparison of Final Waste Disposal Methods, *Ecological Economics*, 50, pp.233-247.

- High external costs are attributed to the landfilling of air pollution control residues from the incinerator. From the study, the provenance of these externalities is not clear;
- The external costs associated with land use for landfills are also very high. This is strange since landfill operators generally pay for land, so the nature of the externality is not clear;
- The emissions to air ignore the emissions to atmosphere of carbon dioxide from non-fossil-derived, or biogenic, sources.⁹² This is not a valid assumption in a comparative analysis;
- The environmental cost savings associated with energy generation are very high for the incinerator. The CO₂ emissions and SO₂ emissions appear high for gas fired power stations.

These comments explain some of the differences relative to our approach. Even so, it is worth noting the effects of air emissions from landfill and incineration. These indicate much lower impacts from landfill than from incineration.

The second, by Bartelings et al, was undertaken with the support of VROM, and this seemed to confirm the findings of the first study.⁹³ Indeed, it was expected that it might refute the findings of the Dijkgraaf and Vollebergh study. However, if anything, it appeared to give greater weight to the idea that on the basis of a cost-benefit analysis, landfill was a more favourable option. The 'best estimate' impacts of landfill and incineration show that even on environmental grounds, landfill performed better (see Table 13). This is due principally to the health and disamenity impacts of incineration being much greater than those for landfill, and the fact that energy related benefits are more moderate than under the Dijkgraaf and Vollebergh study.

As regards net social (private and external) costs, the study notes:⁹⁴

'Taking the 'best' estimate as the basis of our calculation, we conclude that, at the margin, the social costs of incineration (€ 112) exceed the social costs of landfilling (€ 45) substantially. However, the range of uncertainty for the social costs of landfilling is relatively large, and the 'high' estimates for both types of waste management are quite close to each other.'

TABLE 13: EXTERNAL AND PRIVATE COSTS OF LANDFILLING AND INCINERATION IN THE NETHERLANDS (ALL FIGURES IN € PER TONNE)

Externality	Best estimate, Landfill	Best estimate, Incinerator
Greenhouse gas emissions (CH ₄)	4.21	0.11
Other environmental pollution (NO _x)	0.52	0.13
Transport-related externalities	1.25	1.67
Land use	0.00	
Health effects	0.70	7.09
Disamenity costs	3.50	9.09
Subtotal	10.18	18.20
Avoided externalities from the power sector	-1.14	-7.63
Total	9.04	10.57

Source: Bartelings, H., P. van Beukering, O. Kuik, V. Linderhof, F. Oosterhuis, L. Brander and A. Wagtendonk (2005) Effectiveness of Landfill Taxation, R-05/05, Report Commissioned by Ministerie van VROM, November 24, 2005.

The significance of the disamenity issue is clear from the Bartelings et al study. This issue is taken up in more detail below.

6.2.3.1 DISAMENITY

A recent study by EFTEC and Enviro study reviewed some of the literature on disamenity with regard to landfills and incineration.⁹⁵ Cambridge Econometrics and EFTEC themselves carried out a major hedonic⁹⁶ pricing study which estimated the disamenity associated with landfilling.⁹⁷ This was based upon a hedonic pricing study, examining the effect of proximity to landfills on house prices. The Enviro and EFTEC study updated the estimates from the previous study (inflating the estimates in line with house price inflation), giving a range for landfill disamenity of between £2.50 and £3.59 per tonne.

However, the EFTEC and Enviro study excluded disamenity impacts because it felt that the only relevant study on incineration it could find – from the US – was not transferable. Kiel and McClain looked at the effects on house prices over time from the

pre-rumour stage, through to the rumour stage, the construction phase, the online phase, and later years of operation.⁹⁸ They found that house prices were affected only once construction began and peaked in earlier years of operation before falling back slightly. The effect was a reduction of the order 3% per mile in the vicinity of the incinerator.

At one level, the decision not to use the study's findings was understandable. It was, after all, carried out in the United States and the transferability of the results would be questionable. However, the reasoning given is interesting. It was noted

'When this [the disamenity from the incinerator] is compared to the average disamenity cost of landfill from the Defra study of between £551,000 to £789,000 when converted to 2003 prices using house price index changes, the results of Kiel and McClain seem disproportionately large. For this, and also given the fact that the study is from the US, this estimate is not recommended for use in the UK context' (our emphasis).

This is very different to the view taken in a recent Dutch study:⁹⁹

'Given these findings, we assume that the disamenity effects differ between landfilling and incineration. First, the reduction in house prices seems to be more pronounced with incineration. This may be due to the fact that incineration is mainly disliked because of the perception of air pollution. In the Netherlands, since the negative publicity of the emissions of the highly toxic dioxins in the early 1990s, people are more reluctant to live near an incinerator. Even if the legal standards are met, the fear will not disappear immediately. Second, due to the importance of air emissions and the height of the stack, the impact area of an incinerator is significantly larger than the area affected by a landfill site. Therefore, the area of affected houses around the landfill site is limited to a buffer of 1 kilometre around the site. The impact area of incinerators in the Netherlands is assumed to reach as far as 5 kilometres from the actual site.'

The study estimated minimum and maximum values for disamenity of €9.1-9.9 per tonne.

A recent French study carried out a contingent valuation study to assess disamenity.¹⁰⁰ The reported results were estimated at €4.3/tonne (a range of €3.7-€4.9 per tonne). The study suggested that these levels were likely to include some estimate (from residents) of the impacts of air pollution. Consequently, it hinted that these might be high estimates. The relatively low value in the French study may be explained by the fact that the incinerator chosen for the study was in an area of relatively low population density (3km from a city of 50,000 inhabitants), the incinerator dealing with 85,000 tonnes from 52 communes. As such, the disamenity per tonne of waste might be suppressed by the reduced density of housing stock affected by the facility.

Another French study is worth reporting. Rabl et al intended to carry out a contingent valuation study in France. These plans did not materialise as were hoped:

'Initial plans of our research project had been to carry out a contingent valuation in France.'

However, at none of the sites suitable for a case study were the authorities willing to let us survey the opinions of the population. The projects were too controversial, and the authorities were afraid of anything they perceived as potential outside interference.'¹⁰¹

The authors went on to explore attitudes of households to different cost and benefit profiles in an area where facilities were still being discussed.

In our view, it would be reasonable to expect significant disamenity from incinerators as measured through hedonic pricing for the simple reason that the density of housing stock is likely to be greater around incinerators than around landfills. Quite how the disamenity effects of incineration, as measured through contingent valuation approaches, would compare with landfill is still unclear (and likely to vary with location). To the extent that population densities are important, the fact that incinerators are usually in urban or peri-urban locations would suggest that the disamenity would be larger (simply because more households would be affected). On the other hand, we have only limited knowledge from studies seeking to elicit the disamenity associated with municipal waste incineration so do not know the speed at which the disamenity experienced falls with distance (and whether it varies with capacity, and if so how?). Brisson and Pearce suggest 4 miles as the domain of influence for landfills. It could be that this is less in the case of incinerators (though the Dutch study cited above assumed it was 5km).¹⁰²

COWI, in work for the European Commission, used the meta-analysis of Pearce and Brisson, relating house price reductions to proximity to a landfill, and assumed the same relationship applied to houses located near incinerators.¹⁰³ COWI used a population density around the typical incinerator of 120 per square mile. Yet incinerators are rarely located in such sparsely populated areas. Eunomia et al.¹⁰⁴ suggested that the population densities are typically an order of magnitude larger. They suggested if COWI had used a figure of 1,200 households per square mile (469 per square kilometre), the values one arrives at for a 200,000 tonne site, with the annual disamenity being set at 8% of the total, is around €75 per tonne. On the basis of this, they suggested that the importance of the housing

density should not be under-estimated in the modelling of incinerator-related disamenity, and that further work was urgently needed in this area.

It is clear that both the COWI and Eunomia studies were deriving figures which were dependent upon the transferability of a relationship derived for landfills to the incinerator context. Neither study used the disamenity estimate derived in their ultimate analysis, but the suspicion would be that disamenity values could be considerable for these facilities.

6.3 INTEGRATED WASTE MANAGEMENT AND THE CASE FOR INCINERATION

The term 'integrated waste management' (IWM) has, by and large, come to mean, in Ireland, 'waste management with some incineration'. Since 1998, the term has been used to introduce, or posit, the suggested need for 'thermal treatment'. Policy documents repeatedly refer to 'integrated waste management', and in comparisons with other countries, it is always the lack of thermal treatment in Ireland which is seen as so lamentable (as opposed to lack of other non-landfill residual waste treatments, which are equally lacking in Ireland).

IWM (or similar terms) is mentioned a number of times within Changing Our Ways. The document states that in taking a regional approach to waste management, economies of scale can be obtained which will in turn provide a:

'viable framework... for the development of integrated and innovative waste management solutions, facilitating segregated collection and incorporating materials recycling, organic waste composting, other treatment technologies and residual landfill.'

Changing our Ways discusses a number of waste treatment options, including composting (of either separately collected fractions or after post collection sorting), Anaerobic Digestion, Waste to Energy (WTE) and 'Thermolysis' processes (gasification and pyrolysis). However, a much greater proportion of the discussion on waste treatment options is given over to WTE technologies (mass burn) than to any other single treatment option. There is no mention of mechanical biological treatment (MBT) processes for residual waste treatment.

At various points throughout Taking Stock, energy recovery from waste (with a terminology shift from WTE to Thermal Treatment) is mentioned and it appears to be taken for granted that such technologies should be part of any 'Integrated Waste Management' solution. For example:

'Since the publication of Changing our Ways in 1998, the policy framework has been firmly rooted in the "integrated waste management" approach [...] In giving effect to this policy approach in developing waste management plans, local authorities -

- *identified and provided for maximum achievable levels of recycling and biological treatment,*
- *then determined the need for thermal treatment in order to achieve national and EU landfill diversion targets,*
- *finally, provided for environmentally sound landfill of residual wastes which cannot be recovered.'* (our emphasis)

and:

'European waste management policy recognises that waste-to-energy is an environmentally preferable waste management option to landfill. Hence its inclusion as one element in the integrated approach towards ensuring that the amount of waste which ultimately remains to be consigned to landfill is kept to a minimum.'

The integrated waste management approach, based on the waste hierarchy, remains established waste management policy at European Union level and it is the basis on which the successes of the best waste performers in Europe have been built.'

Section 4.2 of the NBS discusses the 'integrated mix of treatment options'. It states that:

'Countries that have succeeded in diverting large quantities of BMW from landfill employ the following alternative treatment options simultaneously:

- *materials recycling for paper and cardboard waste;*
- *central composting, mainly for garden waste and, to a lesser extent, for food waste;*
- *thermal treatment for residual 'mixed' (or 'bagged') waste.'*

There is no mention of MBT in this list, even though the NBS – unusually, as it happens, for national policy documents – does at least mention MBT as a possible treatment technology.

The Forfas reports echo the sentiment expressed in national policy documents:

'An Integrated Strategy: European and Irish waste management policy is based on a hierarchy of options in which prevention and minimisation are ranked as the most desirable strategies, followed by re-use and recycling. Energy recovery is regarded as preferable to disposal, which is viewed as the least desirable option.'

'... The development of thermal treatment facilities will be progressed as part of an integrated waste management strategy that also seeks to increase waste recycling and prevention levels, as described in the first and second sections of this chapter. As this strategy is primarily aimed at achieving national self-sufficiency in waste management, a cap could be set for the volume of waste that individual facilities would be allowed accept, so as to assure the public that incinerator operators could not seek to import waste in order to increase plant throughput.'

6.4 SUMMARY

The approach to consideration of how to treat residual waste looks increasingly one-dimensional and non-strategic in Ireland. The available time for action is dwindling, yet Government persists in encouraging adoption of the very form of treatment which is most time-consuming to bring to fruition, and which has traditionally shown greatest potential to generate public discontent. There is barely a mention of MBT, not to mention the need for a framework for assessing biodegradability of waste from such treatments. The only two residual waste treatments being considered seriously are landfill and incineration, and since waste has to be moved from landfill, every regional plan includes incineration.

The situation is summarised by Davies: ¹⁰⁵

'The threat posed by the unwanted by-products of economic expansion is perceived to be so great that the newly appointed Minister for the Environment has written that 'Ireland is in the midst of a grave waste problem' (Cullen, 2002: 14) and academic commentators are framing

the debates surrounding the treatment of waste as 'cultural wars' (Boyle, 2001). In particular as landfill sites move towards capacity commentators forewarn of a waste crisis heightened rather than diminished by new strategies for the disposal of large amounts of waste through the introduction of thermal treatment plants, more commonly known as incinerators, for municipal waste.'

Plan A is thermal treatment. Given the time-lags likely (even in the more draconian scenarios which are being envisaged), then the targets which are implied by the Landfill Directive are likely to be met with only a minimal contribution from thermal treatment. Even the Dublin region now speaks of moving the target date for thermal treatment back to 2013.

What will take its place? What is being 'integrated' with what in 'integrated waste management'? What use is the suggested approach if it fails to deliver strategic objectives?

Incinerators:

- Will take too long to procure / build / commission etc. in the consideration of Landfill Directive targets;
- Are not much liked by many residents (and this has the potential to lengthen lead-times);
- Are no better, in respect of climate change, than other options available which could be built more quickly (and with a lower quantum of capital and hence, in the context of existing collection practices, risk to the private sector);
- At the currently planned capacity, are likely to compromise even the level of ambition embedded within the existing plans.

Ireland needs 'a Plan B'. That Plan B will have to bite the bullet in respect of:

- **Clarifying which output materials from biological treatments can be used for what purpose, and in what quantities, and with what frequency of application;**
- **Clarifying how MBT residues which are consigned to landfills would be treated for the purpose of the Landfill Directive (see next Section).**

In the absence of such legislation, then given the expected lead-times for incinerators, if Ireland is to meet its Landfill Directive targets, household waste recycling rates will have to improve significantly.

7.0 MECHANICAL BIOLOGICAL TREATMENT AS AN ALTERNATIVE TO THERMAL TREATMENT FOR RESIDUAL WASTES

The waste management hierarchy generally suggests that recycling and composting / digestion of waste is more preferable to treating waste without seeking to recycle or compost such material. Though there may be exceptions to this rule, recent research in the UK, based on a thorough literature search, suggests that the hierarchy generally holds good for dry recyclables.¹⁰⁶ For organic wastes, the analysis is more complex, but where collection systems are well designed, the collection of biowastes for subsequent anaerobic digestion appears to be the most promising option.¹⁰⁷ There is, therefore, enough support for the hierarchy to believe that the approach to Landfill Directive compliance should focus, first and foremost, on the high in hierarchy targets.

It will be recalled that we suggested that if 63% of paper and card and biowaste were captured by 2010 (2004 rates were 60% and 13% respectively), then 2010 targets would be met, using the NBS growth rate for the years to 2010. It will also be recalled that Flanders is currently achieving a rate of source separation from its (differently defined) municipal waste of the order 70%. Seeking to increase recycling and source separation of organics, especially where these are digested, is likely to prove a particularly climate-friendly approach to Landfill Directive compliance.

What should be done with what is left? What alternatives to thermal treatment are there for dealing with waste which cannot be recycled? Could these be used to meet Landfill Directive targets? If so, what are their prospects for adoption in Ireland? One such option is mechanical biological treatment (MBT). This is effectively a family of different treatment types, so it is important to understand what might be implied in the development of facilities in this regard.

7.1 WHAT IS MBT?

MBT is not one single form of treatment. It effectively refers to any combination of mechanical and biological treatments which are brought together to deal with waste, always with more than one of the following objectives:

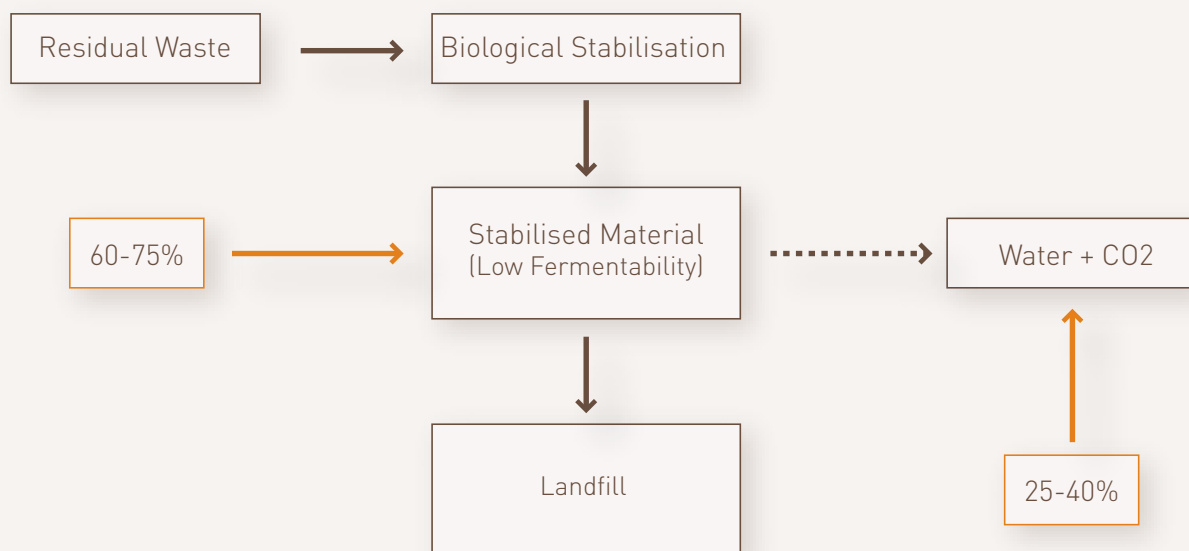
- a) Recovery of materials for recycling;
- b) Treatment of a proportion of the waste stream through biological treatment, whether aerobic or anaerobic, or sometimes both. This treatment can be intended to do one or more of:
 - i. Dry the material;
 - ii. Generate energy from it;
 - iii. Produce a material which can be used in (because of it being of lower quality than material derived from source-separated biowastes) landscaping applications; or
 - iv. 'Stabilise it' (effectively reduce its fermentability) so that when it is landfilled subsequently, there is a much reduced tendency to give rise to methane (and other) emissions;
- c) Separation of a fraction of the waste stream for use as a refuse derived fuel;
- d) Separation of a fraction of the waste stream for landfilling without any form of treatment.

As the above description might suggest, the number of possible permutations is quite large, and already, many permutations are in use. Two configurations are described in the following sections.

7.2 MBT STABILISATION PROCESSES

The most basic MBT facilities were developed on the back of 'mixed waste composting' schemes. It became clear that the mineralization of carbon achieved through biological treatment processes would make it possible to make managing landfills less problematic. Effectively, the waste is 'composted' either before or after it has been subjected to some mechanical sorting to remove recyclable materials. In this configuration, the prime focus is assumed to be that of making the material less likely to generate gas when it is landfilled. The sophistication of sorting processes has tended to increase over time so as to reduce quantities being sent to landfill. The basic principle is outlined in Figure 11

FIGURE 11: BASIC CONCEPT OF STABILISATION AS PRE-TREATMENT (ASSUMING NO MATERIALS RECOVERY)



Different approaches exist for this:

1. **'Whole waste' processes (such as Eco Deco 'Biocubi' or Herhof 'Trockenstabilat'), where the whole mass of waste is subject to biological treatment prior to (in some cases) separation of specific fractions:**

the material is 'homogenised before undergoing an aerobic treatment designed to stabilise the material prior to landfilling. The aim is to reduce the potential for methanogenesis and reduce the potential for leachate to cause damage in the landfill. Metals (and inerts, such as glass and grit) would typically be extracted during the process following biological treatment. These materials would be sent for recycling;

2. **Splitting processes, designed to separate fractions for recycling before biological treatment of the waste, with the residue being stabilized for landfill disposal / use as landscaping material:**

The most basic approach uses magnetic separation of metals prior to sending the whole of the residual mass to landfill following aerobic treatment. Figure 12 shows the schematic from

Siggerwiesen in Austria, where sewage sludge is also treated. This is a very basic design. More sophisticated variants may seek to extract more materials at the front end, and some may also do so at the back end of the process. Some have the objectives of separating out a biological fraction for stabilisation, separating out some material for recycling, and producing a light, high calorific fraction for use as a refuse derived fuel (RDF).

The basic principle behind this approach is to reduce the potential of the landfilled material to generate methane. The aim is to reduce the potential to generate landfill gas to such a level that the residual problem of gas generation in landfills can be dealt with through natural and enhanced natural processes.¹⁰⁸

The behaviour of landfilled stabilized biowastes is quite different to the behaviour of landfilled 'raw waste'. Typically, to demonstrate this, the potential for gas generation is measured through respirometric methods. These demonstrate, for example, the amount of gas generated per unit mass

of material over a specified period of time. Such methods demonstrate that the gas generation is likely to be affected by:

- Process efficiencies (determined by moisture content in the process, airflow, etc.);
- The time in the intensive biological treatment phase and the maturation period;
- The design of the process itself.

FIGURE 12: SCHEMATIC FLOW DIAGRAM FOR MBT SIGGERWIESEN (AUSTRIA)

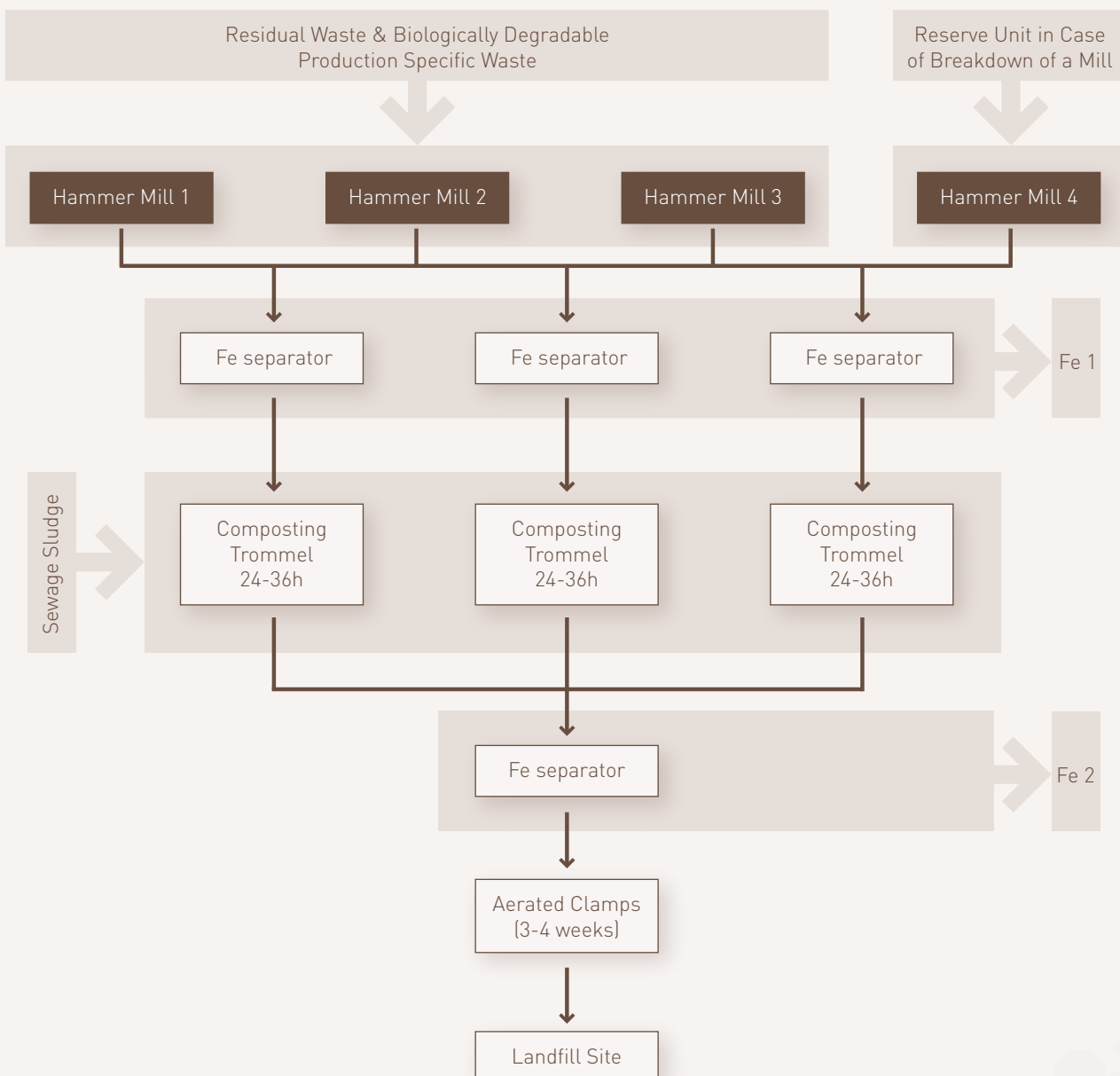
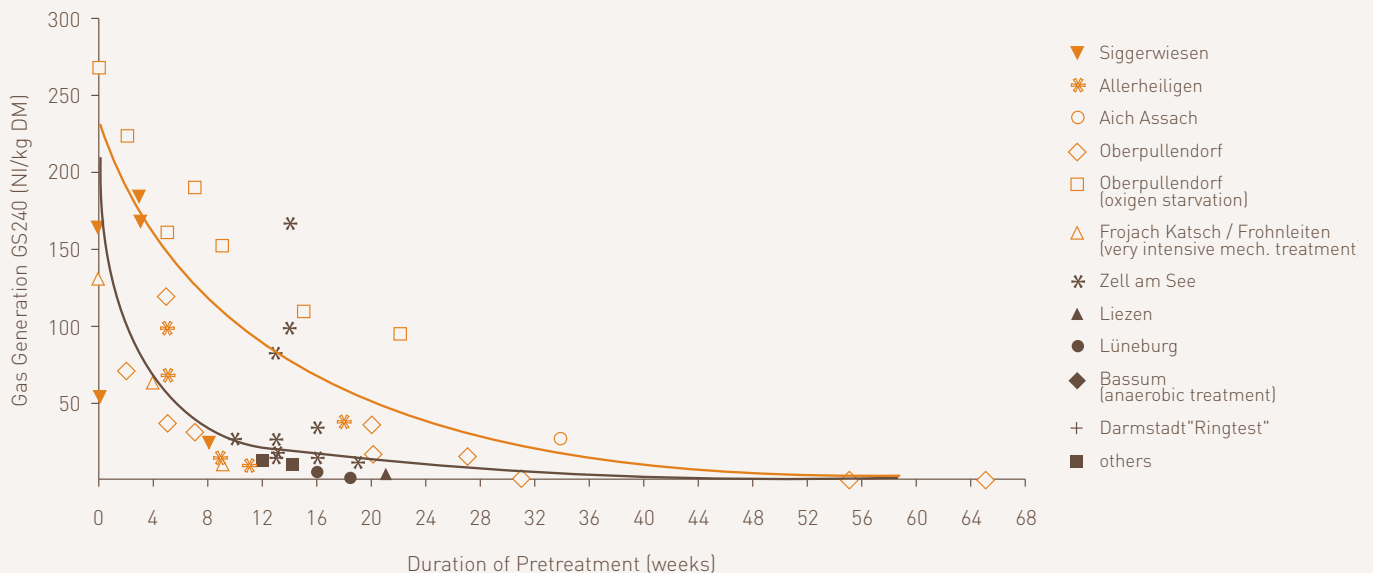


Figure 13 shows how the gas generation of samples of material from different MBT plants varies with the nature of the facility and the length of the treatment process. This also shows that where the waste is being dried during treatment, the potential for samples to generate biogas falls off more slowly with the duration of the pre-treatment process. This indicates that treatments:

- Can significantly reduce the potential for gas generation from waste when it is landfilled;
- Achieve diminishing reductions in the potential for gas generation over time.

The latter point means that incremental reductions in the potential to generate gas are achieved at higher and higher cost increases since the additional time spent by the waste in the process reduces the overall throughput of the plant.

FIGURE 13: ILLUSTRATION OF IMPACT OF LENGTH OF PRE-TREATMENT ON GAS GENERATION POTENTIAL

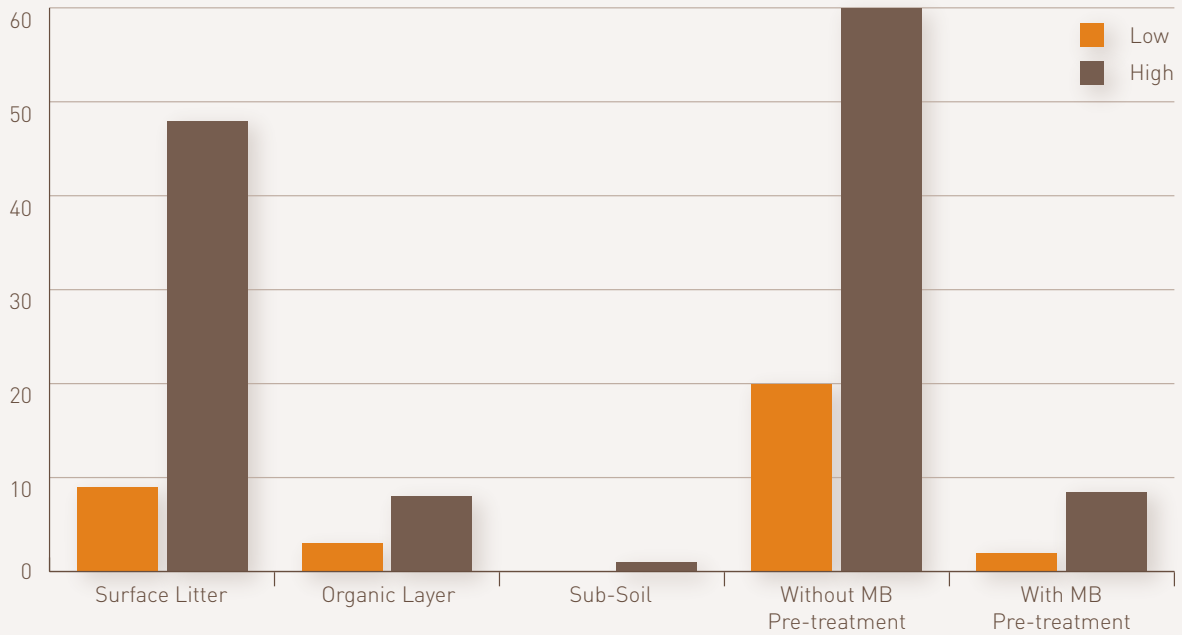


Source: Erwin Binner (2002) The Impact of Mechanical-Biological Pre-treatment on Landfill Behaviour, Paper Presented to the European Commission Biowaste Workshop, May 2002.

Figure 14 opposite shows the results of work undertaken at the University of Potsdam. It suggests that following pre-treatment, materials have a gas production attitude similar to organic layers in the soil.



FIGURE 14: COMPARISON OF RESPIROMETRY RESULTS FROM DIFFERENT MATERIALS AND SOILS



Source: Soyez, K., and Plickert, S. Mechanical-Biological Pre-Treatment of Waste – State of the Art and Potentials of Biotechnology, University of Potsdam, mimeograph.

An example of a stabilisation facility – obviously, similar to an enclosed compost facility – is given in Figure 15.

FIGURE 15: AERATED BOX-TUNNELS FOR AEROBIC STABILISATION



7.3 MECHANICAL BIOLOGICAL TREATMENT, RDF-BASED

In this process, once again, an aerobic 'composting' process is used. However, there is a key difference. Instead of the material being stabilized (made less likely to generate gas) through trying to maintain the biological degradation process over a reasonable period of time, in this case, the intention is to dry the material. Essentially, the airflow through the waste is increased, and whilst in the stabilization process, the mass of material is kept moist to assist degradation. The intention is to dry the material out and use it as a fuel.

As with basic stabilisation processes, there are, in principle, two different approaches to deriving an RDF, based around 'whole waste' treatments and splitting based treatments:

1. Typically, in the first of these, the incoming waste is shredded and then laid out on an aerated floor in an enclosed windrow-type formation. The key difference relative to the stabilisation approach is that because the aim is to increase the calorific value of the material, the principle objective is a drying of the material using both the heat generated by the degradation process and the airflow from the sucking action of the fans drawing air into the biofilter. Essentially, the airflow is increased (relative to the basic stabilisation case), and the total treatment time is much reduced;
2. In the second of these, the material is subjected to various processes of screening, sometimes combined with some size reduction, to split the material into what one may characterise as being a 'large-size, low-density, high calorific value' fraction and a 'small size, high density, principally organic, low calorific fraction'. The former is reserved for use as a fuel, the latter is typically stabilised through an intensive treatment followed by a maturation period and then landfilled.

In either case, because the calorific value of the output material is generally much higher than in the case of waste which has not been subjected to any pre-treatment, the suitability of the material for combustion in standard grate incinerators is likely to

be limited. For this reason, RDF is likely to be moved into the following outlets:

- Cement kilns;
- Power plants;
- Gasifiers;
- Fluidised bed incinerators.

Indirect co-firing (using gasification processes) is also possible.

7.4 FLEXIBILITY OF MBT PROCESSES

It should be clear from the above descriptions that it is quite possible to 'convert' a process whose principle objective is stabilisation into one which seeks to generate an RDF. This means that MBT processes could 'graduate' over time from playing one role to playing another. The worth of this characteristic should not be underestimated when one considers potentially changing waste compositions and future development of facilities which may act as supplementary outlets for the tailored MBT products.

7.5 IRISH NATIONAL POLICY

Of all the national policy documents, only the NBS mentions MBT. The other documents simply make no mention of it whatsoever. Consequently, there is no significant mention of any legislation in respect of Biological Treatment for residual waste within Changing our Ways, Preventing Waste, or Taking Stock. The Forfas reports also give MBT no mention.

Even the NBS is somewhat awkward when it comes to discussing MBT. Indeed, understanding in the strategy of what MBT might achieve is rather limited. Critically, even though the technology is mentioned here and there, there is limited recognition of the fact that, if the material is to be consigned to landfill, no one will invest in this technology unless there is some credit for the pre-treatment process in terms of reducing the biodegradability of what is landfilled. In essence, therefore, in Ireland, we have a policy framework which:

- Barely mentions MBT;
- In any case, does not have the regulatory instruments in place to facilitate its introduction.

It would be difficult to deny, therefore, that Government policy is, implicitly, less than favourably oriented towards MBT at present. This is despite the fact that, as regards compliance with the Landfill Directive, time is not on Ireland's side, and approaches such as MBT might make a significant contribution in the relatively short term.

In what follows, we have outlined approaches taken to regulating outputs from MBT in Germany, Austria and the UK. In addition, given that Ireland already uses the standards in the Second Draft Biowaste Directive to regulate compost facilities, we have outlined the approach set out in that document. This is important since the document made quite clear that if the stability of treated waste met specified standards, then the material would no longer be regarded as biodegradable for the purposes of the Landfill Directive.

7.5.1 GERMANY

In Germany, the TASI (*TA Siedlungsabfall*, or Technical Data Sheet for Urban Waste) limits the volatile organic solids content of waste for landfilling to 5% (assessed by loss on ignition) as of 2005. So residual waste has to be treated and the organic fraction has to be collected (the TASI also lays down that biowaste should be collected separately). From a technical standpoint, this 5% limit would only have been achievable by incineration. However, since 2001, mechanical-biological treatment has been officially accepted as an adequate treatment procedure (in comparison to incineration) to reach the target of a stable landfilling material via a so-called 'law of equivalence'.

7.5.2 AUSTRIA

MSW-compost in principle may not be mixed up with the generation of mechanical-biologically stabilised waste. MSW-compost serves as amelioration for the construction of the final reclamation layer on landfill sites. Mechanical-biologically stabilised waste is dedicated as stabilised waste material allowed for regular disposal or parts of it for incineration. Both processes must be conducted in MBT plants. Following the targets laid down in the *EC Landfill Directive*, the *Austrian Landfill Ordinance*¹⁰⁹ lays down the restriction for the disposal of waste:

'with an organic carbon content greater than 5% /m/m'

with the exemption for waste

'originating from mechanical-biological pre-treatment, that is disposed in separated areas within a mass waste landfill site, if the upper calorific value gained by combustion of the dry matter is below 6,000kJ/kg. The mixing of waste originating from mechanical-biological pre-treatment with materials or waste of low calorific value in order not to exceed the limit value, is not admissible.'

In order to determine criteria for an environmentally sound process design and the suitability of MBT material in accordance with the requirements of the *Austrian Landfill Ordinance*, a working group chaired by the Ministry for Agriculture and Forestry, Environment and Water Management has outlined a *Guideline for the Mechanical Biological Treatment of Waste* (Federal Ministry for Agriculture and Forestry, Environment and Water Management, 2001). The main tasks and provisions of this guideline are listed in Figure 16. overleaf.

FIGURE 16: PROVISIONS OF THE 'GUIDELINE FOR THE MECHANICAL BIOLOGICAL TREATMENT OF WASTE'

Area/provision	Scope/task/objectives
Receipt control	<ul style="list-style-type: none"> • Visual receipt control before any treatment. • Removal and separation of eventually hazardous fractions. • For sludge and industrial waste: approval of origin and identity.
Input materials	<ul style="list-style-type: none"> • Non-hazardous waste only. • No waste from source-separation systems that could be recycled. • Detailed list of admissible waste and input materials. • List A: suitable waste without restrictions. • List B: suitable waste with certain restrictions and additional requirements. • Exclusion of specified waste which may not be treated in a MBT plant.
Requirements for construction, equipment and processing	<ul style="list-style-type: none"> • Licensing of MBT plants. • Waste transport within the facility. • Requirements for the limitation of emissions in physical and mechanical treatment processes. • Requirements for the limitation of emissions in biological treatment processes. <ul style="list-style-type: none"> (a) Closed-in vessel system and cleaning of the entire waste air at least for the first 4 weeks of aerobic treatment; after that period an open rotting technique may be authorised by individual authorisation if the respiration activity (AT4) of the pre-treated material is below 20 mg of oxygen/g dm. (b) After anaerobic pre-treatment the same requirements for the aerobic rotting and stabilisation phase apply.
Limitation of waste air emissions	<ul style="list-style-type: none"> • Total organic compounds: half-day mean value: 40 mg/m³; day mean value: 20 mg/m³; relative mass: 100 g/t_{waste}). • Nitrous oxides (NOx): calculated as NO₂: half-day mean value: 150 mg/m³; day mean value: 100 mg/m³. • Ammonia (NH₃): 20 mg/m³. • Dioxins/Furans: for 2-, 3-, 7-, 8-TCDD-equivalent (I-TEF) ≤ 0.1ng/m³. • Dust: ≤ 10 mg/m³. • Odour emissions: ≤ 500 odour units /m³.
Waste waster capture and treatment	<ul style="list-style-type: none"> • Detailed requirements for the collection, storage and treatment of wastewater.
Determination and control of waste air emissions	<ul style="list-style-type: none"> • Definition of continuous and single measurements. • Requirements for continuous measurements for the determination of half-day and day-mean values (see above). • Requirements for discontinuous measurements for dust, NH₃, PCDD/PCDF and odour-emissions depending on throughput of the plant.
Requirements for the disposal of residual waste	<ul style="list-style-type: none"> • In addition to the provisions of the waste-management-act (organic carbon ≤5% m/m; upper calorific value ≤6,000 kJ/kg). • The following parameter stability criteria apply: <ul style="list-style-type: none"> (a) Respiration activity after 4 days (AT4): ≤7 mg O₂/g dm. (b) Gas generation or fermentation test (incubation 21 days): ≤20 Nl/kg dm. • Provisions for self-controlling, external monitoring and analytical methods.
Protection of labour	
Protection against fire and explosion	
Documentation and compulsory records	
External monitoring and control measures by the responsible authority	
Analytical methods	

7.5.3 UK

The UK embarked on a programme of research to seek to identify appropriate test methods to account for the loss of biodegradability when waste was biologically treated.¹¹⁰ The outcome of this research, and a subsequent consultation, was an approach based upon a combination of two tests, outlined in a separate document.¹¹¹

In essence, two tests, one based upon dynamic respirometry (DR4), the other on the potential of a sample to generate methane over a one hundred day period (BM100), are performed on samples from a process designed to give a full mass balance of the process. The performance of the treatment is assessed on the degree to which the treatment reduces the tendency of the material to biodegrade, as measured by the two tests.

Unlike the German and Austrian approaches, the UK approach does not constitute an 'all or nothing' (biodegradable or not) approach to assessing biodegradability. The measure is used to assess the performance of treatments in the context of the UK's Landfill Allowances Trading Scheme.

7.5.4 EUROPEAN COMMISSION

The Second Draft of the Biowaste Directive also contains within it specific provisions regarding materials treated through MBT. The document states, regarding 'Residual municipal waste':

'The amount and contamination of residual municipal waste should be reduced to the minimum extent possible via the separate collection of municipal waste fractions such as biowaste, packaging, paper and cardboard, glass, metals and hazardous waste.

If residual municipal waste undergoes a mechanical/biological treatment prior to landfilling, the achievement of either a Respiration Activity after four days (AT4) below 10 mg O₂/g dm or a Dynamic Respiration Index below 1,000 mg O₂/kg VS/h shall deem that the treated residual municipal waste is not any more biodegradable waste in the meaning of Article 2 (m) of Directive 1999/31/EC.

If residual municipal waste is incinerated prior to landfilling, the achievement of a Total Organic Carbon value of less than 5% shall deem that the incinerated residual municipal waste is not any more biodegradable waste in the meaning of Article 2 (m) of Directive 1999/31/EC.'

This would have implied that stabilised biowaste meeting the criteria above would no longer be considered as biodegradable for the purposes of the Landfill Directive.

A study carried out for the European Commission in 2001 concluded that:¹¹²

'7. For mainstream options for dealing with bulk MSW as pre-treatment for landfill, the option producing the lowest greenhouse gas flux (a negative flux of some 340 kg CO₂ eq/tonne MSW) is MBT (including metals recovery for recycling) with landfilling of the rejects and stabilised compost. MBT with incineration of rejects (energy recovered as electricity) gives a smaller net negative flux of about 230 kg CO₂ eq/tonne. Mass-burn incineration where half the plants operate in electricity only and half in CHP mode gives a net negative flux of about 180 kg CO₂ eq/tonne MSW. If all the incineration capacity were assumed to operate in CHP mode, then the net flux from incineration would be almost the same as from MBT with landfilling of rejects. On the other hand energy recovery from incineration as electricity only would produce a net flux of only -10 kg CO₂ eq/tonne. These figures are based on EU-average landfill gas control, inclusion of carbon sequestered in MBT compost after landfilling and the replacement of electricity and heat from EU-average plant mix.

8. If the benefits of carbon sequestration are left out of the comparison of options just presented, then the MBT options both produce net positive greenhouse gas fluxes of 23 to 55 kg CO₂ eq/tonne MSW. Incineration is unaffected by assumptions on carbon sequestration.

9. The performance of MBT with landfilling of rejects is further improved as higher standards of landfill gas control are implemented, relative to mass-burn incineration, provided the

contribution from carbon sequestration is included. If sequestration is omitted, incineration continues to perform better than MBT.'

Interestingly, the NBS made reference to this report, but no reference to its findings regarding residual waste options.

7.5.5 REGIONAL WASTE MANAGEMENT PLANS

In many cases (for example the North East), there is no LCA conducted nor MBT or other approaches mentioned in the regional plans. Comments merely recount the hierarchy pointing to a strategy of recycling/composting, EfW, and landfill. Amongst other arguments justifying Dublin's "continued policy" of thermal treatment, the plan states clearly that *"The energy yield from WTE is better than from MBT systems, meaning WTE can reduce greenhouse gas emissions to a greater extent. WTE is therefore placed higher on the Waste Management Hierarchy."* Not only is this contestable in its greenhouse gas balance, but it misses two key qualities of MBT systems. First is their typically faster procurement time and easier ride through the planning processes. Second is their adaptability. Materials can be recovered and the remainder stabilized prior to landfill in advance of the delivery of thermal facilities. Once facilities are available, the technology is adaptable to switch to drying rather than stabilization for the purposes of fuel preparation.

The Cork plan investigates MBT as the second of its three options. Within the environmental and financial assessments this won out over the landfill and thermal scenarios for the short to medium term although the thermal option was the preferred long term solution. Public consultation, however, led to the MBT option as being the *"most appropriate strategic direction for the Cork Region"*, although the County appears to be continuing pursuit of a thermal solution (this is discussed further in Section 6.1.1 above).

The Limerick/Clare/Kerry Region Fehily Timoney reviewed plan stated *"The role of Mechanical pre-treatment and/or Mechanical Biological Treatment (MBT) and other treatment technologies is recognised in order to meet the interim landfill diversion targets."* The report goes on to describe RDF production (for fuel substitution) in the thermal feasibility study (specifically the Herhof system) but it says that markets are limited (since local coal stations need to

be adapted to meet the emissions requirements of 2000/76/EC) and as such the plan focuses solely on incineration for residual waste.

Interestingly, the Kildare plan uses exactly the same LCA study as the other Fehily Timoney plans except the comment is made that *"Kildare does not have the overall waste quantities to generate the economies of scale required to make thermal treatment an option at this point. Thus, Scenario 2b and 3 are not considered suitable."* As such the plan only assesses two options. Unsurprisingly scenario 2 (comprising MBT and landfill for residual waste) gives a better result than scenario 1 (landfill all residual waste). This leads to MBT being proposed to extract remaining recyclables, and then compost the remaining waste prior to landfill.

The Donegal plan states that incineration facilities are unlikely to be located within the county due to economies of scale (and that some waste from the county is likely to be exported, perhaps to the North West Region). However, a technical assessment and feedback from the public consultation led to the BPEO for the region including MBT (but not mass burn incineration), with the objectives of:

1. *Additional materials recovery to meet Strategy targets;*
2. *Reduction in biodegradability to meet statutory BMW landfill diversion and NILAS targets;*
3. *Energy Recovery through the production of a fuel for the generation of both electricity and heat to maximise the value of the waste as a resource.'*

The second objective above points to a real problem facing the use of such stabilisation technology. There are currently no national standards for how MBT can help to divert biodegradable waste from landfill.

The Dublin RWMP includes a section on MBT which is used to justify the choice of incineration as the technology of choice. In Box 1 below, we have commented on some of this text (*in square brackets with orange coloured and italicised text*). Each of the bullet points which are provided as justification for pursuing WTE is either misleading, or shows a degree of misunderstanding, or is simply not correct.

BOX 1: MBT IN THE CONTEXT OF THE DUBLIN RWMP

An MBT process treats mixed municipal waste by mechanically removing some parts of the waste and by biologically treating others so that the residual fraction is smaller and more suitable for a number of possible end uses.

Several waste treatment plants operating in Europe employ some form of MBT. The option is being considered by some authorities and private companies in the UK as a possible alternative to Waste to Energy (WTE) / incineration. *[MBT can also be deployed in a complementary fashion, often with the WTE element being a fluidised bed incinerator].* Several variations on the system exist, and there are varying degrees of sophistication available in MBT systems. Following MBT treatment, the mixed waste is generally *[but not always]* split into two main fractions:

- A dry residue (Refuse Derived Fuel / RDF), which is usually sent for energy recovery by incineration or to cement kilns *[or other industrial facilities / power stations, including, potentially, those fired by peat]* where it is co-combusted with other fuel
- An organic residue, similar to compost but with a higher degree of contamination and impurities, making it unsuitable for high-grade applications (it is often used as a landfill daily cover) There is also a smaller proportion of solid residues such as metal (recycled) and glass/ stones.

MBT does not eliminate the need for landfill *[and nor does WTE in most cases]* but can play a role in reducing the biodegradability of input waste if this must be subsequently landfilled or even used as a landfill cover material. Residues are produced by MBT which must be landfilled or thermally treated. *[This can be compared with WTE facilities which generate hazardous residues from the air pollution control systems. In the case of Poolbeg, it is being proposed that these will have to be exported from Ireland owing to the lack of hazardous waste landfills in the country].*

The possibility for MBT to play a role in the context of the Dublin Region was assessed, bearing in mind that some submissions suggested it would remove the need for a WTE facility. MBT should not be regarded as a direct alternative to WTE. In fact, where RDF is produced by MBT the plant will

form one step in a longer process where energy is recovered from waste. *[This is misleading - whilst MBT can be complementary to WTE, actually, there is no obvious reason why it should not be an alternative because many facilities simply aim to stabilise waste as opposed to generating RDF. Also, and importantly, it could evolve from one approach to the other because of the flexibility of the approach].* Overall it was found that MBT would not offer any significant advantages for the Dublin Region, given that:

- The Dublin Region is pursuing a policy to source separate organic waste to make clean compost – this will remove a significant portion of the organic waste from the mixed waste stream. This approach offers the best chance for the development of a sustainable market outlets for good quality compost / treated organic waste. This market will be very sensitive to product quality. Most MBT facilities are in areas with high rates of source separation for organic wastes. *[This is a common misunderstanding - the existence of a source separation system for organic wastes rarely compromises the operation of MBT – if this were true, it would not be the case that most facilities are in Austria and Germany, where source separation is highly developed].*
- Compost produced from source separated waste has a much higher quality and chance of being utilised than compost produced by screening and sorting mixed municipal waste. The production of large volumes of low grade compost from MBT could be detrimental to the establishment of markets for the cleaner compost and ultimately any compost product. *[DOEHLG / the EPA need to set standards and regulations which a) make clear what compost can go where and b) introduce a measure to determine the biodegradability of pre-treated waste when landfilled, or a threshold condition which, if reached, allows the material to be considered no longer biodegradable from the perspective of the Landfill Directive. This approach has allowed Germany and Austria to maintain quality standards for source-separated biowastes without their being compromised by MBT plants].*

Box 1 Continued

- The feasibility of RDF production is highly dependent on markets and quality / nature of the product; this includes finding facilities that can meet the EU Waste Incineration Directive requirements to burn the MBT residues. These do not currently exist in Ireland. Without such outlets, this material would need to be landfilled, composted or thermally treated at a central facility i.e. this option could result in a regressive situation where energy is expended for no benefit. *[As already stated, not all MBT processes seek to produce an RDF – one option is pre treatment prior to landfilling].*
- The energy yield from WTE is better than from MBT systems, meaning WTE can reduce greenhouse gas emissions to a greater extent. Waste to energy is therefore placed higher on the Waste Management Hierarchy. *[This is incorrect. The greenhouse gas balance of the systems depend on a range of factors of which energy generation is only one – see Section 6.2.3 above. Also, formally, WTE is still disposal whilst some MBT processes, where RDF is used for co-incineration, would be classified as recovery (so higher in the hierarchy)].*
- WTE is a robust treatment technology proven to work well on a variety of waste streams and at the scale required in the Dublin Region. *[There appears to be little clear rationale of what the required scale is (and why only one facility). Many MBT variants could do the job].* On this basis, thermal treatment (with energy recovery) of residual waste i.e. after recycling and composting of source separated organic waste, is the continued policy of the Dublin Region. This policy will deliver a highly integrated system that is optimised in terms of environmental and economic factors.

7.6 SUMMARY

There are alternatives to thermal processes for dealing with residual waste in such a way as to comply with Landfill Directive targets. Enabling regulation is required, and it is in the gift of DOEHLG to develop this. National policy documents and the RWMPs have rather scant information, if any, on these. The NBS notes: ¹¹⁴

'There will be a certain amount of biodegradable municipal waste for which it is not feasible to achieve a sufficient level of segregated collection to satisfy the required landfill diversion targets. Accordingly, there will also be a need to collect this material as residual BMW and to provide treatment – either thermally or through some form of stabilisation – to reduce the biological activity to imperceptible levels and thereby ensure achievement of the mandatory diversion targets.'

Later, it states:

'A Study is now being carried out into the potential contribution of MBT to biodegradable municipal waste management in Ireland under the ERTDI Programme and will inform future policy.'

Without this it will be very difficult to put together a sound business case for any potential MBT projects that do not rely on the product going to an existing thermal facility.

The potential value of MBT processes includes that:

- they can help to meet Landfill Directive targets;
- the simpler forms have a low unit capital cost (even at relatively small scale);
- they can be constructed relatively swiftly.

For Ireland, they would seem to have much to offer. However, without the enabling regulation, they will remain under-utilised, increasing the likelihood that Ireland will fail to meet Landfill Directive targets simply because the preferred option – thermal treatment – is likely to take longer to implement.

8.0 INFRASTRUCTURE AND INSTITUTIONS

At the outset of this report, we highlighted the link between institutions prevailing in the market, and the outcomes which flow from the institutions having their effect.

In Section 5.0, we raised some issues concerning the degree to which a relatively liberal approach to the waste management market, in which the watchword appears to be to promote relatively unfettered competition in the sphere of waste collection, would necessarily lead to the most desirable outcomes.

In Section 6.0, we highlighted the heavy emphasis placed upon the desirability of thermal treatment in national policy documents and in RWMPs. We put forward the view that the degree to which thermal treatment was being proposed as 'the best solution' was, at the very least, open to challenge on grounds where it had been assumed to be superior to other options.

In Section 7.0, we reviewed a credible alternative approach which has received very short shrift in national policy documents and the RWMPs (with some notable exceptions, particularly Cork, where the RWMP's expressed desire to resort to something other than thermal treatment for residual waste was dashed by An Bord Pleanála's decision to overturn a planning refusal for a thermal treatment plant, even though that plant had no position in the RWMP). We highlighted the fact that the institutions governing the existing market were unlikely to call forward investment in such facilities (largely because the absence of consideration of alternatives to thermal treatment led to an absence of consideration of what might be needed to bring forward investment in alternative residual waste treatment options – why waste time designing institutions to help bring into existence something which the government has expressed no enthusiasm for?).

We can now pull the three pieces together. The situation has been that government and those tasked with developing the RWMPs have, in proposing thermal treatment as the most desired solution, effectively overlooked the basic fact that the existing market structure will not deliver such facilities. The lack of serious consideration of

alternatives looks all the more strange, therefore, when considered in the context of the existing market for waste collection.

The key question which now confronts Ireland is 'what institutions do we need to deliver the system we wish to see?'

8.1 DIRECTING WASTE?

In some of the preceding discussion, we have mentioned the debate which has been developing over time concerning the potential need to direct waste into specific facilities, sometimes called flow control. The Consultation document concerning the need for a regulator puts the position as follows:¹¹⁵

'The Minister has recommended that "relevant authorities, in preparing waste management plans, determining the necessary statutory authorisations and in regard to other associated waste management functions, should recognise that the application of the proximity principle does not entail interpreting administrative waste management planning boundaries in such a manner as to inhibit the development of waste infrastructure which will support the attainment of national waste management policy objectives through the rational development and use of such infrastructure."

A regulator could be empowered to direct waste to an appropriate facility in a different region in such cases. In addition, it could also be open to a regulator to direct waste to facilities which are higher up the waste hierarchy so that the waste is dealt with in the most environmentally sound manner. The regulation of facility gate fees could also be used by a regulator for this purpose.'

The last paragraph appears to give two bases for directing waste to a given facility:

- a) cross regional flows;
- b) movement of waste up the hierarchy

Neither would appear appropriate for the direction of waste from within the Dublin Region to a Dublin-based incinerator (no movement across the region,

and no movement up the hierarchy). This is of interest since it is the proposed Poolbeg incinerator which has provided the start point for much of the discussion concerning direction of waste.

Indeed, a recent IWMA meeting with a representative of Dublin City Council made clear that it was the intention of the Council to review all collection permits and that part of the review would include the stipulation that waste should be directed to a specific facility such as Poolbeg. This raises a number of issues:

- The market for waste management in Ireland has, thus far, been one where private sector investment in facilities has been encouraged. The possibility that flow control constraints will be implemented makes it less likely that private sector companies will make such investments unless they know that their own facilities are to be the beneficiaries of a flow control 'order' through waste collection permits. To the extent that those are the only facilities which will be built, the market is no longer open for merchant-based capacity. Indeed, at the limit, all waste is assigned a destination, and the concept of a market disappears altogether. The local authority becomes the determinant of those facilities which will be granted effective monopoly status, a point which would only be marginally less disconcerting were it not for the fact that the local authority might very well be the provider of such facilities;
- In those cases where it becomes clear to developers that they will be the beneficiaries of direction, it would be in the commercial interest of that operator to develop the facility concerned with a greater capacity than is necessary. This is particularly important in the case of facilities whose construction is yet to be complete (of which Poolbeg is one example);
- The direction of waste to a given facility by a local authority raises questions concerning how the gate fee for the specified facility would be set. Collectors would, presumably, have no choice other than to pay whatever rate was set by the owner / operator. The potential for rent-seeking behaviour on the part of the facility operators would appear to be considerable;
- The effect of the implementation of flow control is to create local monopolies. Quite apart from the legal issues which might arise (especially where direction is to a disposal facility), the tension which this seems to highlight in the existing market is clear for all to see. On the one hand, there is some fear of local monopolies in the market for waste collection services, yet on the other, there is an apparent realisation dawning that the only way to get built those facilities which government has pinned its hopes upon is to create monopolies, and potentially, not-so-local ones, in the market for waste disposal;
- There is the thorny question – related to that above – as to who determines what gets directed where, and at what price? If flow control was deemed appropriate for disposal, surely it must be equally so for any facility higher in the hierarchy. If so, progressively diminishing quantities would flow to facilities lower in the hierarchy, and the supposed certainty that direction was intended to deliver would be lost;
- Presumably, even if this were legal, it would not be possible for anyone to specify a collection method which limited movement of waste up the hierarchy. Consequently, if waste collection permits were to direct waste collectors to send residual waste to a specific waste facility, it could not possibly require collectors to suppress their level of recycling by requiring them to collect the waste in a specified way. Even if legitimate, therefore, the price of disposal could lead collectors to increase recycling rates, thereby diminishing the quantity of waste collected as residual waste. In other words, direction gives no certainty as to quantities being directed.

Directing waste, therefore, is one possible route for enabling incinerators to be built in the existing context. It is not, however, the only possible approach. Indeed, there remain some outstanding questions concerning its legality, especially as applied to disposal facilities, in European law, whilst the wider implications for private sector investment in the sector do not appear to have been properly thought through. The whole discussion appears

to have been driven largely by the difficulties in achieving a contractual close on the Poolbeg incinerator, with wider concerns relegated from consideration of how to achieve this short-term objective (with long-term effect).

It is worth noting, in passing, that the concept of public private partnership projects is not so obviously attractive in the current Irish context. To the extent that PPPs are used as a mechanism to call forward investment, arguably, this is only appropriate for waste over which the local authority has clear control, or where the commercial case is compelling (in which case, presumably, the private sector might be expected to make the investment independently). PPPs are premised upon the transfer of risk from the public sector to the private sector. Where the public sector is no longer involved in waste management, there is no risk to be transferred. The logic of 'risk transfer' effectively presumes that local authorities will continue to have such control over waste which they currently collect. This seems to imply that authorities considering PPP projects are intending to control that waste for the foreseeable future. Yet, in the competitive market for collection services, circumstances could arise where local authorities lost market share. In essence, local authorities involved in PPP projects for capital investments are unable to mitigate the most significant risk – that regarding the supply of waste – and as a result, the bankability of such investments will be questionable. To enter into PPP arrangements for large quantities of waste is risky. The only way to reduce that critical risk, and hence, make the investment bankable, would be to intervene in the market place so as to create a monopoly situation.

8.2 ALTERNATIVES?

There are clearly other alternatives to this approach. All of these involve designing the institutions which shape the market for waste management services in such a way as to deliver the desired outcome. The Consultation Paper on the Regulation of the Waste Management Sector realises this.

One solution being proposed by the Confederation of European Waste to Energy Plants (CEWEP) is to manage the permitting of additional landfill capacity.¹¹⁶ This approach is clearly intended to restrict supply of landfill, and hence increase its

price, such that investment in facilities such as incinerators becomes viable. However, landfills resemble 'stock' facilities rather than throughput facilities, and managing the supply of landfill void to manipulate the prevailing price is extraordinarily difficult (not to mention potentially problematic if the regulator in charge 'gets it wrong'). Furthermore, the CEWEP case – that there is too much landfill capacity – adds additional support to the view that MBT-based approaches which do not resort to thermal treatment (and where stabilised residues are landfilled) are entirely appropriate for Ireland.

A more liberal approach could use, for example, one of the following approaches (and these are merely intended as suggested alternatives – others are possible):

- a) One possibility would be to use an allowance trading scheme, as used in the United Kingdom. The quantity of waste permitted to be landfilled untreated would be progressively reduced over time. Whilst in the UK, the allowances are issued to waste disposal authorities, in Ireland, they would probably have to be issued to collectors. This would require a clear tracking mechanism enabling the collected waste to be traced to its final destination. As regards the allocation of allowances, it seems likely that the allowances would need to be auctioned (rather than grandfathered) so as to avoid erecting barriers to new entrants into the collection market. In this option, a standard for 'pre-treatment' would be required, and something similar to that set in the 2nd Draft Biowaste Directive would be appropriate;¹¹⁷
- b) Another possibility would be to pre-announce a ban on the landfilling of untreated waste. As with the previous option, a standard for pre-treatment would be required. The problem with this instrument, in the Irish context, is that a ban cannot be introduced with great rapidity. The lead time needs to be sensible. As such, the instrument is unlikely to be appropriate for Ireland in the short term. It will not, for example, deliver targeted reductions in landfilling of waste in line with the Landfill Directive. It could be considered for the longer term, possibly as an extension of the previous option.

- c) Another would involve use of fiscal instruments
- o If the intention is to move waste away from landfill, a higher landfill tax would help achieve this objective. This does, however, have the potential to give additional stimulus to illegal activities, notably, cross-border movements of waste, to Northern Ireland. It would, however help to ensure that waste was destined, as far as possible, for non-landfill treatment or recycling / composting / anaerobic digestion;
 - o Section 6.0 highlighted the fact that the external costs of landfilling do not seem to be necessarily in excess of those for incineration, where only electricity is recovered. There might be good reasons to introduce an incineration tax alongside the existing landfill tax. The aim would be to move waste management up the hierarchy, ensuring that the future did not simply imply moving large quantities of waste away from one disposal route (landfill) and into another (incineration);
 - o Section 7.0 highlighted the potential role of MBT options. The external costs of landfilled stabilised biowaste are likely to be well below those of waste when landfilled untreated. A landfill tax could, therefore, be differentiated according to whether the waste had reached a specified criterion in respect of its respirometric activity. Ireland has used standards from the 2nd Draft Biowaste Directive as benchmarks for compost standards. It would seem, therefore, appropriate to make use of the standard for stabilised biowaste in the same document as a means for a) differentiating the level of landfill tax and b) using this as a standard to determine when, for the purposes of the Landfill Directive, the waste is deemed no longer biodegradable.

Under these approaches, collection arrangements could remain much as they are. The effect would be to shape the market through price mechanisms, as well as one facilitating regulatory change. Use of

these instruments would, especially if accompanied by revised targets in national policy for recycling (since these appear to be lacking in longer-term ambition), be expected to improve recycling rates considerably through increasing the avoided cost of disposal. Each would be expected to lead to investment in alternatives to landfill, and not simply incineration (subject to RWMPs making space for such residual waste treatments).

Other alternatives also exist. What is clear is that this question is central to Irish waste management policy moving forward. It is not *just* a question of how to move waste into disposal facilities. It is also a question concerning, amongst others:

- How to ensure that collection of dry recyclables can deliver high captures of material of high quality;
- How to create the framework for investment in high quality collection and treatment infrastructure for organic wastes;
- How to ensure that the institutions in the market deliver the best outcome in terms of the application of pay-by-use;
- How to ensure that households in rural areas can be provided with, and can be made more likely to 'take up', or make use of, a quality waste collection service.

Resolution of this question – and the Consultation Paper on the Regulation of the Waste Management Sector has started the debate – is central for Ireland if it is to continue building on the progress already made.

9.0 ISSUES OF COMPETITION

9.1.1 THE DUAL ROLE OF LOCAL AUTHORITIES

One of the issues with which Greenstar – and other private sector companies – is most concerned is the relationship between, and the implications for competition between, public and private sector. In the existing situation, local authorities:

- are responsible for issuing waste collection permits, and may influence the terms of these;
- have the power to develop bylaws influencing, for example, the way waste materials are presented;
- can engage directly in waste collection activity;
- are responsible for developing RWMPs, with the County Manager effectively having the power to sign these off;
- are responsible for waste planning issues (insofar as these are not major projects, or PPP projects – see below);
- are likely to submit planning applications for landfills and other waste management facilities in their own right;
- are not required to charge VAT, whilst the private sector does (and whilst businesses can set VAT on inputs against outputs, households cannot);
- may operate facilities in their own right.

This has been recognised by DOEHLG in its Consultation Paper on the Regulation of the Waste Sector:¹¹⁸

The private waste sector has highlighted the following main areas of concern to the industry:

- (a) *Unlike their private sector counterparts, local authorities are not required to obtain collection permits in order to engage in the commercial collection of waste.*
- (b) *Local authorities are required to undergo a less onerous registration process for certain waste activities, whereas their private sector counterparts are required to obtain waste permits for the same activities. Permitting is also more costly for the private sector.*
- (c) *The planning system operates differently for private sector and public sector*

projects. It takes longer to obtain planning permission for private sector projects than it does to obtain permission for local authority projects. In addition, while local authorities can obtain registration for their projects within a short timescale, the permitting of private sector projects can be subject to delays. Disparities in planning and permitting timescales may give local authorities an advantage over private waste companies in setting up their own waste facilities. The Strategic Infrastructure Bill seeks to address this issue.

- (d) *The Environment Fund comprises monies raised through both the plastic bag levy and the landfill levy. The landfill levy is charged at €15 per tonne based on every tonne of waste which goes to landfill. Local authority waste infrastructure projects are part funded by the Environment Fund, however no funding is available for private sector waste projects despite the contribution that private sector waste companies make towards the landfill levy and ultimately the Environment Fund.*
- (e) *Local authorities and the private sector are both competing in the same market therefore it would be expected that they would operate under the same market conditions.'*

These issues appear to have the potential to distort competition. The Indecon Report, for example, noted that the lack of full cost recovery on the part of local authorities was likely to affect competition, not to mention, require additional revenue sources to support the services provided.¹¹⁹ The additional time in the planning process, and the difference in processes which the private sector and local authorities are required to go through to obtain permits, impose additional administrative burdens on industry relative to local authorities. Finally, if it is the intention of the Government to engender genuine competition in the market, then save for the type of subvention identified by the ESRI report (see above) in respect of legacy issues (where the past pattern of ownership of landfills might implicitly bias funding in

favour of local authorities), then the differing terms of access to the Environmental Fund appear to have the potential to distort competition.

Local authorities occupy a highly strategic position. They have, historically, owned and operated landfills, and have been the main collectors of household waste. In the period following the Waste Management Act, one might reasonably assume that as costs increased, so local authorities, as landfill operators, may have sought to benefit from the scarcity of void space in the country. This could have allowed landfill prices to be raised above levels which might have prevailed in a more competitive market. In addition, where the same local authority both operated the household collection service and operated the landfill, there would have been scope for differential pricing in which commercial collectors making use of the site were effectively cross-subsidising the costs of landfilling household waste.

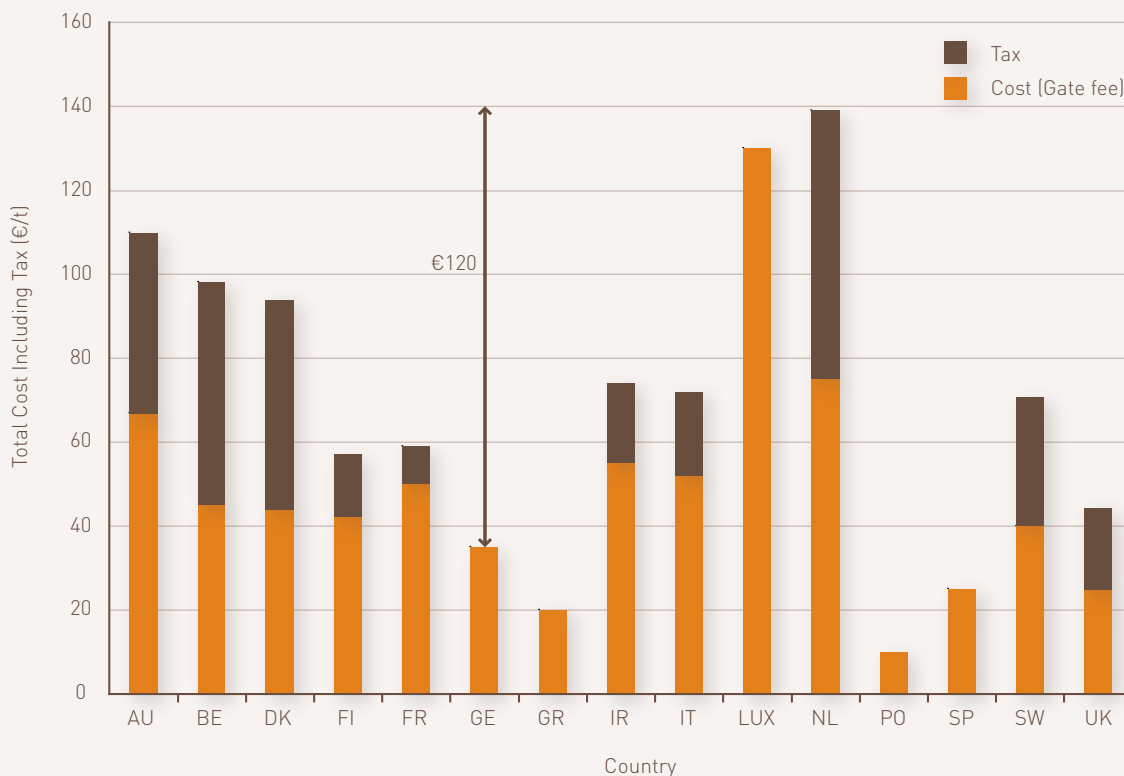
Furthermore, local authorities will also have had the power to engineer continuing scarcity of void

space provision, so prolonging their somewhat privileged position. The potential for abuse of what is, effectively, market power appears to have been recognised in the ESRI report: ¹²⁰

'Where Local Authorities continue to be the only supplier of services in an area, there is a requirement to ensure that pricing reflects efficient levels of operation. Currently, Local Authorities act as suppliers, planning authorities and environmental regulators in the waste management industry. This means they are potentially conflicted in dealings with private operators, which could distort competition. With each Local Authority acting as regulator, there is scope for inconsistency geographically and temporally. A single regulatory structure applicable throughout the State would help encourage private participation in the market.'

Whether such abuses actually occurred, or whether they did not, might be considered idle speculation.

FIGURE 17: INDICATIVE LANDFILL COSTS AND GATE FEES, EU-15



Source: Eunomia et al (2001) Costs for Municipal Waste Management in the EU, Report for DG Environment, European Commission.

It is interesting to note, however, that landfill gate fees now appear to be falling. A study by ourselves of landfill gate fees and taxes at the turn of the decade indicated that even then, when landfill gate fees were rather lower on average than now, only Austria, Luxembourg and the Netherlands had higher gate fees before tax (see Figure 17).

In recent years, Ireland would probably have had as high a gate fee as for any country in the old EU-15 (not to mention the EU-25). These are now falling, as new landfills are being given planning permission. Figure 17 suggests that these gate fees could fall much further as more void space is consented, and as regional monopolies are weakened. It also gives credence to the view that when local authorities were the only operators of landfills, gate fees were probably used a source of revenue for various other activities. The arrival of the private sector in landfill operation might be expected, therefore, to lead to falling landfill gate fees, with the indirect effect of possibly giving rise to budgetary problems in other aspects of local government.

The key question which this discussion raises is, essentially, how is it that the Government wishes the waste management sector to be structured? If the aim is to harness competition, and to allow local authorities to act as competitors in the market, then it seems very clear that the potential for abuse – whether this is real or merely perceived – ought to be removed. Local authorities currently have a wide range of powers which enable them to make decisions which, irrespective of the soundness of the basis for making them, are likely to give rise to considerable suspicion. Their ability to do this ought to be curtailed.

10.0 CONSULTATION

In discussions with community groups, it is difficult not to carry away a feeling that, in respect of waste management issues, communities in Ireland feel disenchanted to a considerable degree, particularly where the issue concerning the role of incineration in local strategies is concerned. On the one hand, one can highlight clear reasons why this feeling might be somewhat pervasive. On the other hand, as Davies notes, there are outstanding questions related to the disjuncture between public disquiet around the issue, and the relative absence of public response to Draft RWMPs.

10.1 LOCAL POLITICS AND THE REGIONAL WASTE MANAGEMENT PLAN

One clearly important change in the extent of public representation in the preparation of RWMPs came within the Waste Management (Amendment) Bill 2001. As Davies puts it: ¹²¹

Specifically it was this identification of the need for municipal incineration facilities for the first time in Ireland that was to cause the most problems in the process of adopting waste management plans. So challenging did some local authorities find reaching agreement about incineration that by 2000 six out of 28 of them still had no plan in place.

... In a decisive act, which was to fuel rather than contain heated debates about democracy, the Minister for the Environment intervened in the stalemate in March 2001 when he introduced the Waste Management (Amendment) Bill, 2001. Alongside the more progressive developments contained within the Bill, including an environmental levy both on plastic bags and waste sent to landfill, was the transfer of the responsibility for the adoption of waste management plans from the elected members of local authorities to local authority managers. As noted by Boyle (2001) the aim of this transfer was to remove the adoption decision from the electoral process, but by doing so it was also open to criticism for eroding fundamental aspects of local democracy.

Even before this, however, it would appear that attempts to engage with communities early in the development of RWMPs were rare. Consultation

approaches appear to have been somewhat passive, with few attempts to reach out to communities at early stages in the development of the approach to waste management.

One could argue that the thrust of national policy might have been partly responsible for that. It barely needs pointing out that, although all decisions concerning the 'where' of waste management facilities have the potential to be contentious, some are likely to be more contentious than others. Those regarding what to do with residual waste are particularly likely to generate public concern. It could be argued that this most contentious decision had largely been made for the regions. The lack of consideration of alternatives to thermal treatment has been highlighted above [see Section 6.1], and one academic has highlighted the similarity in the RWMPs in their proposed resort to thermal treatment: ¹²²

Engineering consultants based in Ireland drafted all the Waste Management Plans. Fehily, Timoney & Company produced the Joint Waste Management Plan for the South East, Tobin Environmental Services Ltd., were the consultants for the Cork plan while M.C. O'Sullivan and Co. Ltd. prepared the remainder. There is a remarkable similarity both in presentation and content of all the plans, each one recommending thermal treatment alongside recycling, biological treatment and reduced landfill. These consultants were characterised as 'waste experts', with their role defined as information provider and educationalist to local authorities, industry, business and publics. In the particular context of waste management in Ireland the consultants have to be seen as key decision-influencers in the waste management debate and they were pivotal in defining the strategic vision for waste in Ireland (our emphasis).

The shift in responsibility for signing-off RWMPs away from politicians and into the hands of county managers effectively made it possible for the adoption process to be speeded up. What is more debatable is whether the adoption of the RWMPs has done, or even could have done, a great deal to speed their delivery. County managers do not control the waste stream, and nor do they have the

power to eliminate all risks in the delivery of the facilities which they themselves have adopted. In a liberal market-oriented system, the role of county managers is, almost by definition, insufficient to ensure delivery of any RWMP for the simple reason that the county managers do not have competence to alter all the institutions in the market which would need to be re-configured to make that the case.

10.2 RECENT DEVELOPMENTS

There have been various campaigns against incineration across Ireland. Some of the major campaigns have been in Cork and in Dublin. Community groups feel they have not been listened to. There are particular concerns with the way in which the issue of health effects has been dealt with. Community groups feel they have been passed from pillar to post on this matter. The line taken by government, when there has been an opinion expressed, has been that European Directives ensure protection of human health. Davies' opinion is as follows: ¹²⁴

The official Government response to public health fears over incineration and landfills has been to label them as alarmist and without sound scientific evidence. The Government is clearly attempting to reassure publics that science, engineering and technology can resolve what they consider to be technical difficulties with the processes of incineration.

Whatever the merits or otherwise of incineration technology, it is rare to find any commentator prepared to argue that there are no health effects from incineration, and if there are health effects, then a comparative assessment (against other technologies) appears to be of relevance, not least to local communities faced with the siting of such facilities.

Communities are genuinely concerned that the Planning and Development (Strategic Infrastructure) Act 2006 will make it more difficult for them to raise legitimate concerns in the context of new planning applications. They also express concerns regarding the movement of personnel between private sector and regulatory bodies. In short, there is a genuine

concern that decisions of importance to local communities have, for all intents and purposes, already been made by the time communities are consulted. This view seems to be fuelled by a feeling that consultation has not been sincere in seeking to elicit views and opinion in the formulation of RWMPs. Rather, it has sought feedback on plans already largely determined.

Involving communities in decision-making is an evolving discipline. There is no shortage of approaches which could be adopted. Equally, there is no 'right' approach. In waste management decisions, however, experience suggests that communities are less inclined to respond to abstract plan documents and more inclined to become involved only when planning applications are made for specific facilities. One interpretation of this would be to depict this as a manifestation of public apathy, which commutes to a not-in-my-backyard (NIMBY) attitude once planning applications are made. Another, perhaps more illuminating, interpretation is that the effort to involve communities in the development of plans needs to be more pro-active precisely because the RWMP has a more abstract meaning to communities at that point. This can help to understand communities' concerns prior to the planning application stage and during plan development. Up front (early) consultation is key to involving communities in the development of a plan.

The Strategic Infrastructure Act will allow applications to be made directly to An Bord Pleanála where the installation is for landfill, incineration or chemical treatment of hazardous waste, or for the same facilities for non-hazardous waste of a size greater than 100,000 tonnes. Public private partnership projects are entitled to follow this route anyway, but for other facilities, this could (and is intended to) streamline planning decisions. Whether the concerns of communities with regard to the passing of the Act will be justified by events is not yet clear. What is clear is that the majority of RWMPs are already written, and there is no commitment to revise these in the short-term. Indeed, recent revisions have been made, and with one or two notable exceptions, it seems that consultation has been passive.

11.0 CONCLUSIONS

Irish waste management has made enormous strides over the past decade. As well as reducing the environmental impact of existing landfills, significant steps have been taken, especially in respect of commercial and industrial waste, to increase the quantity of material being recycled and reduce the country's heavy reliance on landfill. Ireland has made significant strides towards a more sustainable management of resources in the waste stream. There is a sense, however, that progress is levelling off in some areas, and there is concern that no progress has been made in some key areas. Key issues arising from the report are as follows:

1. There remain questions as to how waste data can be made still more reliable in the future. One possibility would be to ensure that the auditing of that data which is gathered is collated and examined thoroughly. It seems less than clear that the local authorities should be effectively auditing their data, as well as that of others. An independent audit of data would be more appropriate.
 2. Where national policy documents and RWMPs are making forward projections (as indeed they should), far greater care and attention needs to be taken in making such projections. As far as possible, projections should be made at that level of government with the greatest influence over the waste stream concerned.
 3. The national policy targets and those in the RWMPs deserve to be reappraised. If there was little by way of clear logic for their initial levels, now is the right time to take stock of progress and consider how the future of waste in Ireland is to be conceived.
 4. To follow the RWMPs as they are currently set out may be counter-productive. We would suggest that the RWMPs be reviewed by an independent body, and the targets established therein scrutinised so as to minimise the potential for regret in the context of future developments in Irish waste management.
 5. National policy documents did not give much thought to meeting Landfill Directive Article 5 targets until the Draft national Biodegradable Waste Strategy in 2004. There remains a lack of a clear mechanism for meeting these targets.
- Policy instruments exist with the potential to have an impact. However, time is running out for Ireland. Time has become a precious resource for the country as it seeks to carve a trajectory towards compliance.
6. The Department for Environment, Heritage and Local Government (DOEHLG) needs to consider whether the existing institutions governing the market for waste collection are the right ones. The desire to foster a competitive waste market may potentially result in increased costs to householders, whilst also limiting the evolution of the services which might be offered (and hence the recycling rates achieved). In the short term, Ireland needs to be confident that the market will – in future – deliver the right balance of outcomes in terms of performance and cost. This is a prior question which needs to be answered before the issue of whether, and if so, what type, of regulator is needed. It is also, logically, a prior question to the one of understanding how the market can deliver the non-landfill waste treatments which are needed in the future.
 7. If the market is left in its current state, then the following options would be worth considering so as to give greater confidence to investors, though none necessarily secures delivery of waste to a *specific* facility:
 - a. employ market-based instruments to give greater certainty regarding the price of different treatments. The current situation is one where a landfill tax exists; but there is no tax on incineration (the analysis in the main document appears to suggest that there is an argument in its favour). The landfill tax is at a relatively low level, partly one assumes due to the high level of pre-tax gate fees. These are, however, beginning to fall as competition increases, and void space availability improves;
 - b. employ regulatory instruments restricting the quantity of waste which can be landfilled. This could either be through setting pre-treatment standards for all landfilled waste or through some form of allowance trading mechanism, as applied in the UK (albeit, in that case, only applied to biodegradable municipal waste);

- c. require authorities to tender services in their area on the understanding that the winning tenderer has exclusive rights to collect waste in that area (and discussion would need to occur as to whether this was appropriate for all waste, or only household waste, with the latter being the more likely outcome).

It is possible that a) and / or b) could be combined with c).

8. There is a pressing need to consider whether the capacity for treating biodegradable municipal waste – anticipated as necessary in the National Biodegradable Waste Strategy for meeting Landfill Directive targets – is likely to be delivered in the remaining time available (before 2010). It would appear that Ireland needs a Plan B (something other than incineration). DOEHLG and the EPA should consider introducing clear regulations regarding:
 - a. which output materials from biological treatments can be used for what purpose, and in what quantities, and with what frequency of application;
 - b. the effects of biological pre-treatment on the biodegradability of waste. This would enable local authorities to consider alternatives (to incineration) in the context of their RWMPs as a means to deliver targets set out in the Landfill Directive.
9. The fact that the issue of flow control is raising its head highlights the existing mismatch between the institutions in the market place, and the preference, in national policy and the RWMPs, for residual waste treatments which will not be viable without additional interventions in the market. Flow control is one – possibly the least desirable, and potentially illegal – mechanism to deal with the situation. Where incinerators are concerned, under existing EU law, the approach implies directing waste to disposal facilities. The flow control issue sits uneasily alongside an otherwise liberal approach to the market for waste management services. Whilst implementing flow control may be attractive to ensure the Dublin incinerator becomes commercially viable, wider

questions concerning the scale of the proposed facility, as well as the wider policy framework and the decisions made in existing RWMPs, are deserving of review in the context of the slowness of progress in implementing any form of residual waste treatment infrastructure in Ireland (which sits, incidentally, in stark contrast to the pace of change in many other respects). This is partly because the business case for anything other than incineration has been difficult to make, whilst the institutions in the market place have made incineration too risky from a commercial perspective.

10. There are alternatives to thermal processes for dealing with residual waste in such a way as to comply with Landfill Directive targets. Enabling regulation is required, this being the responsibility of DOEHLG. The potential value of MBT processes includes that:
 - a. they can (in an appropriate regulatory framework) contribute to meeting Landfill Directive targets;
 - b. the simpler forms have a low unit capital cost (even at relatively small scale);
 - c. some designs are flexible in terms of their mode of operation; and
 - d. they can be constructed relatively swiftly.

For Ireland, they would seem to have much to offer. However, without the enabling regulation, they will remain under-utilised, increasing the likelihood that Ireland will fail to meet Landfill Directive targets simply because the preferred option – thermal treatment – is likely to take too long to implement.

11. If the aim is to harness competition, and to allow local authorities to act as competitors in the market, then it seems very clear that the potential for abuse – whether this is real or merely perceived – ought to be removed. Local authorities currently have a wide range of powers which enable them to make decisions which, irrespective of the soundness of the basis for making them, are likely to give rise to considerable suspicion. Their ability to do this ought to be curtailed.

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OPINION OF ADVOCATE GENERAL JACOBS

delivered on 26 September 2002 (1)

Case C-458/00

Commission of the European Communities v Grand Duchy of Luxembourg

1. In this action brought under Article 226 EC, the Commission claims that objections raised by the Grand Duchy of Luxembourg against certain shipments of waste to other Member States to be used principally as fuel were unjustified and contrary to the wording of Article 7(2) and (4) of Council Regulation (EEC) No 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into and out of the European Community ('the Regulation') (2) and Article 1(f) read in conjunction with head R1 of Annex IIB to Council Directive 75/442/EEC of 15 July 1975 on waste ('the Directive or 'the Waste Directive'). (3) The Commission accordingly seeks a declaration that Luxembourg has failed to fulfil its obligations under Articles 2, 6 and 7 of the Regulation and Article 1(f) read in conjunction with head R1 of Annex IIB to the Directive.

2. The case essentially turns on the distinction between operations for the disposal of waste and operations for its recovery, and in particular on the question whether the incineration of municipal waste at an incineration plant in which most or all of the heat generated is used as energy is correctly to be classified as a disposal operation or a recovery operation.

The relevant Community legislation
The Directive

3. Article 3(1) of the Directive requires Member States to take appropriate measures to encourage '[a] firstly, the prevention or reduction of waste production and its harmfulness and '[b] secondly: (i) the recovery of waste by means of recycling, re-use or reclamation or any other process with a view to extracting secondary raw materials, or (ii) the use of waste as a source of energy.

4. Article 5 of the Directive enshrines the principles of self-sufficiency and proximity. It provides as follows:

'1. Member States shall take appropriate measures, in cooperation with other Member States where this is necessary or advisable, to establish an integrated and adequate network of disposal installations, taking account of the best available technology not involving excessive costs. The network must enable the Community as a whole to become self-sufficient in waste disposal and the Member States to move towards that aim individually, taking into account geographical circumstances or the need for specialised installations for certain types of waste.
2. The network must also enable waste to be disposed of in one of the nearest appropriate installations, by means of the most appropriate methods and technologies in order to ensure a high level of protection for the environment and public health.

5. The Directive defines 'disposal as 'any of the operations provided for in Annex IIA (4) and 'recovery as 'any of the operations provided for in Annex IIB. (5)

6. Annexes IIA and IIB to the Directive (6) are headed 'Disposal operations and 'Recovery operations respectively. Each annex is prefaced by a note to the effect that it is intended to list the operations 'as they occur in practice.

7. Annex IIA includes among the listed disposal operations:
'D10 Incineration on land.

8. Annex IIB includes among the listed recovery operations:
'R1 Use principally as a fuel or other means to generate energy.
The Regulation

9. The Regulation is based on Article 130s of the EC Treaty (now, after amendment, Article 175 EC). Its aim is to provide a harmonised set of procedures whereby movements of waste can be limited in order to secure protection of the environment. (7)

10. Title II of the Regulation is entitled 'Shipments of waste between Member States. Chapters A and B of Title II lay down the procedures to be followed for the shipment of waste for disposal and of waste for recovery respectively.

11. The Regulation adopts the definitions of 'disposal and 'recovery used in the Directive. (8)

12. The procedure for shipments of waste for recovery varies according to the type of waste. Annexes II to IV to the Regulation classify specific waste in one of three lists. (9) Annex II contains the 'Green list of wastes, which 'should not normally present a risk to the environment if properly recovered in the country of destination. (10) Annex III contains the 'Amber list of wastes and Annex IV the 'Red list of wastes, regarded as particularly hazardous. Shipments of

waste shown in Annex II for recovery are simply to be accompanied by a document containing prescribed information. (11) Shipments of other waste (including the waste the shipment of which gave rise to the present proceedings) for recovery and shipments of waste for disposal are subject to the following procedure.

13. Where the producer or holder of waste, generally referred to as the notifier, (12) intends to ship such waste from one Member State to another, he must notify the competent authority of destination and send a copy of the notification to the competent authority of dispatch (13) and to the consignee. (14)

14. Notification is to be effected by means of the consignment note to be issued by the authority of dispatch. (15) The notifier is to complete the consignment note and, if requested by the competent authorities, supply additional information and documentation. (16) He is to supply on the consignment note information with particular regard to a number of factors including (i) the source, composition and quantity of the waste and (ii) the operations involving disposal or recovery as referred to in Annex IIA or IIB to the Directive. (17)

15. In the case of shipments of waste for recovery, the consignment note must also include details of (i) the planned method of disposal for the residual waste after recycling has taken place; (ii) the amount of the recycled material in relation to the residual waste and (iii) the estimated value of the recycled material. (18)

16. In the case of waste for disposal, the Member State of destination is responsible for granting authorisation for shipment. The Member State of dispatch (19) has the right to raise objections and the Member State of destination may issue the authorisation only in the absence of any such objections. (20) In the case of waste for recovery, the Member States of dispatch and destination (21) have the right to object to a shipment but, as a general rule, (22) no express authorisation is required. (23)

17. The most significant difference between the procedures applying to the shipments of waste for recovery and for disposal lies in the grounds on which the various competent authorities concerned may oppose the proposed shipment.

18. In the case of waste for disposal, the objections must be based on Article 4(3). (24) Under that article, in particular, (i) Member States may prohibit generally or partially or object systematically to shipments of waste in order to implement the principles of proximity, priority for recovery and self-sufficiency at Community and national levels in accordance with the Directive (25) and (ii) the competent authorities of dispatch and destination may raise reasoned objections to planned shipments if they are not in accordance with the Directive in order to implement the principle of self-sufficiency at Community and national levels. (26) 19. In the case of waste for recovery, the objections are to be based on Article 7(4). (27) Article 7(4)(a) (28) lists five grounds on which the competent authorities of destination and dispatch may raise reasoned objections. Those grounds do not provide for objections to be based on the principles of proximity or self-sufficiency. The case-law of the Court

20. Two decisions of the Court are of particular interest in the context of the present case.

21. First, the Court ruled in *Dusseldorp* (29) that the principles of self-sufficiency and proximity do not apply to waste for recovery; such waste should therefore be able to move freely between Member States for processing, provided that transport poses no threat to the environment.

22. Second, the Court ruled in *ASA* (30) that the essential characteristic of a waste recovery operation is that its principal objective is that the waste serve a useful purpose in replacing other materials which would have had to be used for that purpose, thereby conserving natural resources. That case concerned inter alia the correct classification for the purpose of the Regulation (namely, as a recovery or a disposal operation) of the deposit of waste in a former salt mine to secure hollow spaces (mine-sealing).

23. The Court also ruled in *ASA* that Articles 4(3) and 7(4) exhaustively list the cases in which Member States may object to a shipment of waste between Member States. (31) The action for infringement

24. In early 1998 the undertaking NTMR (Négoce de tous matériaux réutilisables) submitted two notifications to the competent Luxembourg authority seeking authorisation to ship household and similar waste coming under position AD160, 'Municipal/household wastes, of Annex III (amber list) to the Regulation. It appears that NTMR's notifications indicated that the shipment

was of waste for recovery to be processed at the incinerator of the municipality of Strasbourg. According to the Commission (which has not been contradicted on this point), it appears from a letter from the Prefect of the Bas-Rhin (32) dated 3 July 1998 that incineration at that plant enables all the energy generated thereby to be recovered.

25. By decision of 1 October 1998 the competent authority in Luxembourg re-classified the shipment as concerning waste for disposal which could be shipped only on proof that for technical reasons or because of insufficient capacity the waste could not be delivered to a disposal plant in Luxembourg. The authority justified that re-classification on the basis that the incineration of waste in a plant the primary purpose of which is thermal treatment with a view to the mineralisation (33) of the waste, whether or not there is recovery of the heat produced, is considered in Luxembourg to be a disposal operation coming under head D10 in Annex IIA to the Waste Directive.

26. Considering that those facts suggested that Luxembourg had infringed the Regulation and the Directive, the Commission sent it a formal notice which was not answered. The Commission accordingly issued a reasoned opinion. In its reply Luxembourg maintained in essence that the fact that energy generated by a waste processing operation may be recovered does not preclude classification of that operation as a disposal operation under head D10 of Annex IIA to the Directive, that it had re-classified the operation with the agreement of the French authorities, that Articles 3 and 4 rather than Articles 6 and 7 of the Regulation were therefore applicable and that Luxembourg had accordingly not infringed the legislation.

27. Luxembourg also noted in its reply that its waste incineration plant enabled the heat generated by the incineration to be used, in particular for the production of electrical energy which was fed into the national grid.

28. Since Luxembourg has not taken the measures necessary to comply with the reasoned opinion, the Commission has brought the present action.

29. Austria has intervened in support of Luxembourg.

30. The Commission is seeking a declaration that Luxembourg has failed to fulfil its obligations under Articles 2, 6 and 7 of Regulation No 259/93 and Article 1(f) read in conjunction with head R1 of Annex IIB to Directive 75/442. The alleged infringement consisted in Luxembourg's raising unjustified objections against certain shipments of waste to other Member States to be used principally as fuel. At issue therefore is the correct classification in accordance with the Directive - and hence also the Regulation - of the incineration of household waste in an incineration plant which uses most or all of the energy thereby generated. Is it necessarily a recovery operation, as the Commission maintains, in which case the objections, essentially on the ground of self-sufficiency in the disposal of waste, raised by Luxembourg cannot be justified and the infringement is made out, or is it, as Luxembourg maintains, a disposal operation, in which case the objections may be justified on the basis of that principle?

31. The Commission's principal submission is drawn from the wording of Annex IIB. 'Use principally as a fuel or other means to generate energy

32. The Commission maintains that the decisive test is, first, whether the incineration process generates more energy, or heat transformed into energy, than the energy or heat which would have been generated from combustion of the gas injected into the furnace in order to incinerate the waste - in other words, is there a net production of energy? - and, second, whether the plant is able to reclaim or recover a substantial proportion of the energy contained in the incinerated waste.

33. Luxembourg considers that the Commission's position in effect bases the distinction between disposal and recovery on the energy potential of the waste in question. The definition of recovery operation R1 ('Use principally as a fuel') however is based on the criterion of use and hence of the objective of the operation, and not the quality or composition of the waste. Luxembourg submits that the correct criterion is the objective of the incineration plant: if its principal objective is the generation of energy, the incineration is a recovery operation; if however its objective is the thermal processing of waste, whether or not there is accessory reclamation of energy, the incineration is a disposal operation.

34. Each party submitted at the hearing that the judgment in ASA (34) - which was delivered after the written procedure in the present case had ended - supported its position.

35. The Commission considers that the principles there laid down are wholly applicable to the present case with the result that the operation should be classified as a recovery operation. It

follows from that judgment that the objective of the operation determines its classification. Luxembourg, however, focuses on the objective of the incineration plant. The Commission submits that the correct criterion is whether the energy generated by the incineration is in fact reclaimed, thereby serving a useful purpose.

36. Luxembourg argues on the other hand that the criterion formulated by the Court in ASA, namely that of the principal objective of the operation, is in effect the same as the criterion of the objective of the incineration plant used by Luxembourg.

37. I agree with the Commission that, in order to determine whether a given operation is to be classified as a disposal operation falling within head D10 of Annex IIA to the Directive or as a recovery operation under head R1 of Annex IIB, the wording of the descriptions set out under those heads must be carefully analysed.

38. Head R1 refers to 'Use principally as a fuel or other means to generate energy.

39. As Luxembourg argues, the criterion of use requires interpretation in the light of the objective of the operation. That conclusion follows clearly, in my view, from the natural meaning of the term 'use, and perhaps in particular the concept of 'use principally as something. It may be noted that that construction - or the analogous 'principal use as - is reflected in all the language versions of the Directive with the exception of the Greek version (which refers to 'use as without qualification).

40. The Commission submits that, since head R1 refers to 'Use principally as a fuel or other means to generate energy, classification as a recovery operation must extend not only to use principally as a fuel but also to use as any other means to generate energy. That argument suggests that the qualification 'principally is not relevant where waste is being used not as fuel but as another means to generate energy. That seems to me to be an unnatural reading of the provision - in all the language versions (with the exception of the Greek version). (35) It is clear to me that, in order to fall under head R1 of Annex IIB to the Directive, an operation must consist in the use of waste principally as a fuel or the use of waste principally as another means to generate energy.

41. On the basis of the wording of the legislation, therefore, an incineration operation will not fall within the description in head R1 unless its objective is the use of waste principally as a fuel or the use of waste principally as another means to generate energy. If that condition is not satisfied, the operation will be incineration on land under head D10 of Annex IIA to the Directive. (36)

42. That analysis is consistent with the judgment in ASA, (37) where the Court ruled that the principal objective of a recovery operation is that the waste serve a useful purpose in replacing other materials which would have had to be used for that purpose, thereby conserving natural resources. As I suggested in my Opinion in that case, the decisive question is whether the waste is used for a genuine purpose: if it were not available for a given operation, would that operation none the less be carried out using some other material? (38) In the case of waste being incinerated in a plant developed for that purpose, the answer to that question is clearly 'no: in the absence of available waste, there would be no incineration. In those circumstances it would not be right to describe the operation as recovery simply because, whenever waste is available and incinerated, the heat generated by the incineration is used, wholly or partly, as a means to generate energy. That fact does not of itself make the principal objective of the incineration the use of the waste as a fuel or other means to generate energy.

43. The notion of the 'principal objective can thus be regarded as a criterion of general application, of which heads D10 and R1 are specific applications.

44. The significance of the objective of the operation may be seen particularly clearly in cases involving the incineration of household waste with incidental energy recuperation. Classifying all such operations as recovery solely on the basis that the energy generated - however little - is recovered leads to unacceptable consequences. The Commission states in its application that Community law prescribes no minimum quantity of energy generated in order for the incineration of waste with accessory energy recuperation to be classified as a recovery operation: at most it may be conceded that an operation is not recovery if that quantity is 'ridiculously small. It appears however from information provided to the Court that the incineration of urban waste with energy recovery is the principal method of disposing of such waste in many Member States; classifying all such operations as recovery simply on the basis of that energy recuperation would in effect mean that such waste could be shipped within the Community with little restriction, which would run counter to the Regulation's objective of providing a harmonised set of procedures whereby movements of waste can be limited in order

to secure protection of the environment. (39) In that context it may also be noted that the Council in its Resolution of 24 February 1997 on a Community strategy for waste management (40) notes and shares the concerns of Member States at the large-scale movements within the Community of waste for incineration with or without energy recovery. (41)

45. That the principal objective of the incineration operation at issue in the present case is disposal rather than recovery is also suggested by which party bears the cost of the transaction: the contracts between the Luxembourg holders of the waste and the municipality of Strasbourg, which are among the annexes to the defence, provide for the holders to pay to the municipality the fee currently applicable when the waste is transported to the plant. Although I do not consider that payment by the holder of the waste is necessarily conclusive evidence that a given operation is disposal rather than recovery, it will normally none the less be a significant factor. (42)

46. The approach I propose - namely that a given incineration operation will constitute disposal if that is its principal objective, notwithstanding that there maybe incidental energy recovery - to my mind achieves the correct balance between the principle of the free movement of goods and that of the protection of the environment. It is clearly desirable on environmental grounds to limit large-scale shipments of household waste for incineration; if, however, incineration of such waste were classified as recovery simply on the basis that the resulting energy could be used, transport of such waste - possibly over significant distances - would be encouraged.

47. Moreover that solution is confirmed if the present case is contrasted with *Commission v Germany*, (43) in which I am also delivering my Opinion today. That case concerns the correct classification for the purposes of the Regulation of waste to be incinerated in cement factories; the energy generated by the incineration is to be used in the manufacturing process where it will replace conventional fuel in one instance by up to one third and in the other instance totally. In my Opinion I express the view that the principal objective of an incineration operation which is an integral part of an industrial process and which generates energy to be used in that industrial process may be said to be the use of the waste as a fuel. If one puts the question whether, if the waste were not available for a given operation, that operation would none the less be carried out using some other material, the answer in the case of waste used as fuel for a cement factory is clearly 'yes: in the absence of available waste, the factory would still operate using other fuel.

Conclusion

48. I am accordingly of the opinion that the Court should:

(1) dismiss the Commission's application;

(2) order the Commission to pay the costs.

1: - Original language: English.

2: - OJ 1993 L 30, p. 1.

3: - OJ 1975 L 194, p. 39, as amended by Council Directive 91/156/EEC of 18 March 1991, OJ 1991 L 78, p. 32, and by Council Directive 91/692/EEC of 23 December 1991, OJ 1991 L 377, p. 48.

4: - Article 1(e).

5: - Article 1(f).

6: - As adapted by Commission Decision 96/350/EC of 24 May 1996 adapting Annexes IIA and IIB to Council Directive 75/442/EEC on waste, OJ 1996 L 135, p. 32.

7: - Case C-187/93 *Parliament v Council* [1994] ECR I-2857, paragraph 26 of the judgment.

8: - Article 2(i) and (k).

9: - As adapted by Commission Decision 94/721/EC of 21 October 1994 adapting, pursuant to Article 42(3), Annexes II, III and IV to Council Regulation (EEC) No 259/93 on the supervision and control of shipments of waste within, into and out of the European Community, OJ 1994 L 288, p.36.

10: - Recital 14 in the preamble to the Regulation.

11: - Articles 1(3) and 11 of the Regulation.

12: - Article 2(g).

13: - And, if relevant, of transit.

14: - Articles 3(1) (waste for disposal) and 6(1) (waste for recovery).

15: - Articles 3(3) and 6(3).

16: - Articles 3(4) and 6(4).

17: - Articles 3(5) and 6(5), first and fifth indents.

18: - Article 6(5), sixth, seventh and eighth indents.

19: - And, if relevant, of transit.

20: - Articles 4(1) and 4(2).

21: - And, if relevant, of transit.

22: - Where the waste is listed in Annex IV or has not been assigned to Annex II, III or IV, the competent authorities concerned must give their consent in writing (Article 10).

23: - Article 7(1) and (2).

24: - Article 4(2)(c).

- 25: - Article 4(3)(a)(i).
- 26: - Article 4(3)(b)(i).
- 27: - Article 7(2).
- 28: - Article 7(4)(b) concerns the objections which may be raised by the competent authorities of transit, not relevant to the present case.
- 29: - Case C-203/96 [1998] ECR I-4075, paragraphs 33 and 34 of the judgment.
- 30: - Case C-6/00, paragraph 69 of the judgment delivered on 27 February 2002. It may be noted that the judgment was delivered after the pleadings in the present case had been lodged.
- 31: - Cited in note 30, paragraph 36 of the judgment.
- 32: - Strasbourg is in the département of the Bas-Rhin.
- 33: - Converting an organic to a mineral substance.
- 34: - Cited in note 30.
- 35: - See in particular the French and German versions: 'Utilisation principale comme combustible ou autre moyen de produire de l'énergie' and 'Hauptverwendung als Brennstoff oder andere Mittel der Energieerzeugung.
- 36: - Or, if appropriate, incineration at sea under head D11.
- 37: - Cited in note 30, paragraph 69 of the judgment.
- 38: - Paragraph 86.
- 39: - Parliament v Council, cited in note 7, paragraph 26 of the judgment.
- 40: - OJ 1997 C 76, p. 1.
- 41: - Point 42.
- 42: - See further paragraph 88 of my Opinion in ASA, cited in note 30.
- 43: - Case C-228/00; see in particular paragraph 56 of the Opinion.

OPINION OF ADVOCATE GENERAL JACOBS

delivered on 26 September 2002 (1)

Case C-228/00

Commission of the European Communities v Federal Republic of Germany

1. In this action brought under Article 226 EC, the Commission claims that objections raised by the Federal Republic of Germany against certain shipments of waste to other Member States to be used principally as fuel were unjustified and contrary to Article 7(2) and (4) of Council Regulation (EEC) No 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into and out of the European Community ('the Regulation'). (2) The Commission accordingly seeks a declaration that Germany has failed to fulfil its obligations under Article 7(2) and (4) of the Regulation.

2. The case essentially turns on the distinction between operations for the disposal of waste and operations for its recovery, and in particular on the question whether the incineration of waste in an industrial process generating energy to be used in that process is correctly to be classified as a disposal operation or a recovery operation.

The relevant Community legislation
The Waste Directive

3. Article 3(1) of Council Directive 75/442/EEC of 15 July 1975 on waste as amended (3) ('the Waste Directive' or 'the Directive') requires Member States to take appropriate measures to encourage '(a) firstly, the prevention or reduction of waste production and its harmfulness and '(b) secondly: (i) the recovery of waste by means of recycling, re-use or reclamation or any other process with a view to extracting secondary raw materials, or (ii) the use of waste as a source of energy.

4. Article 5 of the Directive enshrines the principles of self-sufficiency and proximity. It provides as follows:

- '1. Member States shall take appropriate measures, in cooperation with other Member States where this is necessary or advisable, to establish an integrated and adequate network of disposal installations, taking account of the best available technology not involving excessive costs. The network must enable the Community as a whole to become self-sufficient in waste disposal and the Member States to move towards that aim individually, taking into account geographical circumstances or the need for specialised installations for certain types of waste.
- 2. The network must also enable waste to be disposed of in one of the nearest appropriate installations, by means of the most appropriate methods and technologies in order to ensure a high level of protection for the environment and public health.

5. The Directive defines 'disposal' as 'any of the operations provided for in Annex IIA (4) and 'recovery' as 'any of the operations provided for in Annex IIB. (5)

6. Annexes IIA and IIB to the Directive (6) are headed 'Disposal operations' and 'Recovery operations' respectively. Each annex is prefaced by a note to the effect that it is intended to list the operations 'as they occur in practice and that in accordance with Article 4 (7) 'waste must be [disposed of/recovered] without endangering human health and without the use of processes or methods likely to harm the environment.

7. Annex IIA includes among the listed disposal operations:
'D10 Incineration on land.

8. Annex IIB includes among the listed recovery operations:
'R1 Use principally as a fuel or other means to generate energy.
The Regulation

9. The Regulation is based on Article 130s of the EC Treaty (now, after amendment, Article 174 EC). Its aim is to provide a harmonised set of procedures whereby movements of waste can be limited in order to secure protection of the environment. (8)

10. Title II of the Regulation is entitled 'Shipments of waste between Member States. Chapters A and B of Title II lay down the procedures to be followed for the shipment of waste for disposal and of waste for recovery respectively.

11. The Regulation adopts the definitions of 'disposal' and 'recovery' used in the Directive. (9)

12. The procedure for shipments of waste for recovery varies according to the type of waste. Annexes II to IV to the Regulation classify specific waste in one of three lists. (10) Annex II contains the 'Green list of wastes, which 'should not normally present a risk to the environment if properly recovered in the country of destination. (11) Annex III contains the 'Amber list of wastes and Annex IV the 'Red list of wastes, regarded as particularly hazardous. Shipments of waste shown in Annex II for recovery are simply to be accompanied by a document containing prescribed information. (12) Shipments of other waste (including the waste the shipment of which gave rise to the present proceedings) for recovery and shipments of waste for disposal are subject to the following procedure.

13. Where the producer or holder of waste, generally referred to as the notifier, (13) intends to ship such waste from one Member State to another, he must notify the competent authority of destination and send a copy of the notification to the competent authority of dispatch (14) and to the consignee. (15)

14. Notification is to be effected by means of the consignment note to be issued by the authority of dispatch. (16) The notifier is to complete the consignment note and, if requested by the competent authorities, supply additional information and documentation. (17) He is to supply on the consignment note information with particular regard to a number of factors including (i) the source, composition and quantity of the waste and (ii) the operations involving disposal or recovery as referred to in Annex IIA or IIB to the Directive. (18)

15. In the case of shipments of waste for recovery, the consignment note must also include details of (i) the planned method of disposal for the residual waste after recycling has taken place; (ii) the amount of the recycled material in relation to the residual waste and (iii) the estimated value of the recycled material. (19)

16. In the case of waste for disposal, the Member State of destination is responsible for granting authorisation for shipment. The Member State of dispatch (20) has the right to raise objections and the Member State of destination may issue the authorisation only in the absence of any such objections. (21) In the case of waste for recovery, the Member States of dispatch and destination (22) have the right to object to a shipment but, as a general rule, (23) no express authorisation is required. (24)

17. The most significant difference between the procedures applying to the shipments of waste for recovery and for disposal lies in the grounds on which the various competent authorities concerned may oppose the proposed shipment.

18. In the case of waste for disposal, the objections must be based on Article 4(3). (25) Under that article, in particular, (i) Member States may prohibit generally or partially or object systematically to shipments of waste in order to implement the principles of proximity, priority for recovery and self-sufficiency at Community and national levels in accordance with the Directive (26) and (ii) the competent authorities of dispatch and destination may raise reasoned objections to planned shipments if they are not in accordance with the Directive in order to implement the principle of self-sufficiency at Community and national levels. (27)

19. In the case of waste for recovery, the objections are to be based on Article 7(4). (28) Article 7(4)(a) (29) lists five grounds on which the competent authorities of destination and dispatch may raise reasoned objections of which only the fifth is of relevance in the present case. That ground - set out in the fifth indent of Article 7(4)(a) - is as follows:
- if the ratio of the recoverable and non-recoverable waste, the estimated value of the materials to be finally recovered or the cost of the recovery and the cost of the disposal of the nonrecoverable fraction do not justify the recovery under economic and environmental consideration.

The case-law of the Court

20. Two decisions of the Court are of particular interest in the context of the present case.

21. First, the Court ruled in *Dusseldorp* (30) that the principles of self-sufficiency and proximity do not apply to waste for recovery; such waste should therefore be able to move freely between Member States for processing, provided that transport poses no threat to the environment.

22. Second, the Court ruled in *ASA* (31) that the essential characteristic of a waste recovery operation is that its principal objective is that the waste serve a useful purpose in replacing other materials which would have had to be used for that purpose, thereby conserving natural resources. That case concerned inter alia the correct classification for the purpose of the Regulation (namely, as a recovery or a disposal operation) of the deposit of waste in a former salt mine to secure hollow spaces (mine-sealing).

23. The Court also ruled in *ASA* that Articles 4(3) and 7(4) exhaustively list the cases in which Member States may object to a shipment of waste between Member States. (32)
The action for infringement

24. This action for infringement arises indirectly from several proposed shipments of waste from Germany to Belgium. The shipments had been notified to the German competent authorities as shipments of waste intended for recovery; the German authorities considered that the proposed operations were in reality disposal operations.

25. The shipments concerned two categories of waste.

26. First, there was waste which had already been processed in Germany into a substitute fuel. Waste such as shellac, colorant, latex, oil and phenol sludges, halogenated and nonhalogenated distillation residues from solvent recovery, non-halogenated solvents, sludges from cleaning tanks and washing vats, filter cakes, bleaching clay, aluminium sludge etc. had been mixed with sawdust; the mixture was intended for incineration in cement kilns, where it replaced up to one third of the energy from primary sources otherwise used. In certain cases the calorific value of the waste was at least 11 000 kJ/kg.

27. Second, there was waste which was to be processed in a plant in Belgium into a substitute fuel called 'Resofuel'. The waste consisted of activated carbon and graphite waste, distillation residues containing solvents, materials impregnated with solvents (absorbents, alumina and sawdust, the latter partly contaminated by organic and inorganic substances), residues of synthetic thermoresistant substances, mixed synthetic waste, sludges containing polymerised synthetic substances, wood shavings, sawdust, wood fibres and sludges from paper manufacture. The resulting 'Resofuel' was intended for incineration, in particular in cement kilns, where it could totally replace energy from primary sources.

28. The competent authorities in Germany for the purpose of the Regulation are at the level of the Länder. The authorities of North Rhine-Westphalia, Baden-Württemberg, Rhineland-Palatinate and Lower Saxony raised objections against the proposed shipments on the ground that the waste was intended for disposal and not for recovery and that the disposal should take place in Germany. In the case of the first two Länder, those decisions were based on circulars issued by the relevant Ministries of the Environment, laying down criteria for distinguishing between recovery and disposal in the case of waste to be burnt. In particular, in order for such an operation to be classified as recovery under head R1 of Annex IIB to the Directive ('Use principally as a fuel or other means to generate energy (33)), the waste in question - and in the case of mixed waste each constituent waste - must have a calorific value of at least 11 000 kJ/kg, at least 75% of the energy generated from the operation must be used and prescribed thresholds of polluting substances contained in the waste must not be exceeded. Unless all those conditions were met, the operation would be classified as disposal under head D10 or D11 of Annex IIA ('Incineration on land or 'Incineration at sea).

29. The Commission, having received several complaints concerning the German authorities' objections to proposed shipments of the abovementioned waste, initially wrote to Germany inviting an explanation. In its reply Germany maintained that the practice complained of complied with the relevant Community provisions and confirmed the view of the competent federal authorities that the shipments at issue concerned waste intended for disposal.

30. The Commission, unconvinced, sent Germany a letter of formal notice in which it expressed the opinion that the shipments at issue concerned waste intended for recovery and that the Germany authorities could accordingly rely only on the grounds of objection set out in Article 7(4) of the Regulation. The Commission took the position that the incineration of the waste in the Belgian cement kilns was a recovery operation falling under head R1 in Annex IIB to the Waste Directive, namely 'Use principally as a fuel ...', or under head R13, 'Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where it is produced) read in combination with head R1.

31. In its reply, Germany maintained its position. Since the Commission remained of the view that the shipments to Belgium of the waste in question concerned waste for recovery and that consequently objections could be raised only on the basis of Article 7(4) of the Regulation, in February 1999 it sent Germany a reasoned opinion pursuant to Article 169(1) of the EC Treaty (now Article 226(1) EC). Still considering, despite Germany's response, that the measures complained of were contrary to the Regulation, the Commission has brought the present action for infringement.

Admissibility

32. Germany submits that the action against it is inadmissible on the basis that neither in the prelitigation procedure nor in the application to the Court does the Commission specify the precise object of the proceedings sufficiently clearly to enable it to defend itself. The administrative decisions which the Commission seeks to put in issue cannot be identified from the letter of formal notice, the reasoned opinion or the application. The Commission simply refers to three circulars issued by the Länder of North Rhine-Westphalia and Baden-Württemberg. Those circulars however do not contain 'unjustified objections to certain shipments of waste to other Member States to be used principally as fuel since they merely set general criteria for distinguishing thermic disposal from the recovery of energy.

33. The Commission submits that on the contrary it set out the subject-matter of the action with great precision both in the pre-litigation procedure and in the application. In particular the application confirms that 'the administrative practices of the competent authorities of the federal Länder of North Rhine-Westphalia, Baden-Württemberg, Lower Saxony and Rhineland-Palatinate are impugned on the ground that they do not comply with the Treaty. That practice is exemplified both by circulars adopted by the competent ministries and by individual decisions taken by the competent authorities in which those authorities, partly on the basis of the circulars, raised objections against certain shipments of waste on the grounds set out in Article 4 of the Regulation.

34. It is settled case-law that the letter of formal notice and the reasoned opinion issued by the Commission delimit the subject-matter of the dispute so that it cannot thereafter be extended. The opportunity for the State concerned to submit its observations constitutes an essential guarantee intended by the Treaty, adherence to which is an essential formal requirement of the infringement procedure. (34) One purpose of the letter of formal notice is to ensure that the Member State concerned is aware of the points on which it may need to prepare its defence. (35)

35. The Commission's seven-page letter of formal notice refers in some detail both to the two complaints which initiated the proceedings and to the circulars issued by the authorities in North Rhine-Westphalia and Baden-Württemberg. It states clearly that the competent authorities raised objections on the basis of the circulars to the shipments concerned in the specific complaints. It refers also to further decisions by the authorities of Lower Saxony and Rhineland-Pfalz, in both cases giving dates and indicating that the decisions were based on the assumption that the intended operations were disposal rather than recovery operations. The letter of formal notice states that the Commission considers that the shipments are to be regarded as destined for recovery and that Article 7(4)(a) of the Regulation is the appropriate provision for possible objections. In particular it specifies that the Commission is of the view that the operation falls under head R1 of Annex IIB to the Directive ('Use principally as a fuel ...') and not under head D10 of Annex IIA ('Incineration on land'). The letter of formal notice concludes:

'On the basis of its current state of knowledge the Commission accordingly considers that the Federal Republic of Germany has infringed its obligations under [the Regulation], the second paragraph of Article 189 [of the EC Treaty, now Article 249 EC] and in particular Article 7(2) and (4) of [the Directive].

36. In my view the letter of formal notice, given the contents as described above, adequately indicated as required by the case-law of the Court the essential elements of the Commission's position. In response, Germany sent the Commission an 18-page response in which it set out its arguments in full. It expressed the view that, until the Community legislature had better defined recovery and disposal, the national authorities were bound to set specific criteria for operations under heads D10 of Annex IIA and R1 of Annex IIB to the Directive. In Germany's view, recovery presupposed that the principal objective of the operation was the generation of energy. The various criteria used sought to ensure that only when that definition was satisfied would an operation be classified as recovery.
37. As for the reasoned opinion, the Court has ruled that the purpose of the requirement in Article 226 EC that the Commission deliver a reasoned opinion is 'to give the Member State an opportunity to justify its position and, as the case may be, to enable the Commission to persuade the Member State to comply of its own accord with the requirements of the Treaty. If this attempt to reach a settlement is unsuccessful, the function of the reasoned opinion is to define the subject-matter of the dispute. (36)
38. The reasoned opinion in the present case is in similar terms to the letter of formal notice; in addition the relevant Community legislation is set out and the relevant case-law summarised. The Commission prefaces its analysis of the alleged infringement with the statement: 'The Commission maintains the view that the shipments in question are destined for recovery, and that a Member State therefore may object to a shipment of waste only on the basis of criteria set out in Article 7(4)(a) of Regulation 259/93 or by invoking Article 130t EC, and that the measures taken by the Federal Republic of Germany are not justified and therefore infringe Community law.
39. The reasoned opinion also contains a summary of the German arguments put forward in the reply to the letter of formal notice followed by the Commission's refutation of those arguments. It concludes with the declaration that Germany 'has infringed Regulation EEC No 259/93 Articles 7(2) and (4).
40. Again, Germany sent a response to the reasoned opinion, repeating its earlier position and referring to the 'lack of clarity of the reasoned opinion.
41. It may be that the letter of formal notice and the reasoned opinion could have been drafted with greater precision. However it is apparent from the above summary of their contents that the documents gave a sufficient indication of the subject-matter of the dispute as required by the case-law of the Court. The reasoned opinion did not moreover broaden that subject -matter as compared to the letter of formal notice (or the application compared to the reasoned opinion), which would not have been permissible.
42. I accordingly conclude that the action brought by the Commission is admissible. The issues before the Court
43. The Commission submits that the administrative practice of the German Länder in question is contrary to Article 7(2) and (4) of the Regulation: it is clear from Article 7(2) that the competent authorities of the Member State of dispatch may raise objections against the shipment to another Member State of waste for recovery only on the basis of Article 7(4), which does not include the principle of self-sufficiency apparently relied on by the competent authorities of those Länder, on the basis of administrative circulars, in their objections against the shipments of waste. At issue essentially therefore is whether the operation to which the waste in question was to be subject constitutes recovery or disposal. In particular the parties are at odds over the questions whether the Länder were entitled to formulate criteria not to be found in the Community waste legislation in order to distinguish between the two types of operation for the purpose of application of the Regulation, what precisely is meant by 'Use principally as a fuel or other means to generate energy in head R1 of Annex IIB to the Directive and whether the specific criteria set by the Länder in the present case are lawful in the sense that they correctly reflect criteria inherent in the Directive. I shall consider those issues in turn. Member States' discretion to set criteria
44. Germany submits, first, that the Member States have the power to lay down their own criteria for distinguishing between disposal and recovery operations in cases such as those at issue, given the potential overlap between the disposal operation under D10 'Incineration on land and the recovery operation under R1 'Use principally as a fuel or other means to generate energy and the lack of further guidance in the Community legislation.

45. Germany refers to several other Member States which have also set criteria for the distinction, in particular by imposing a minimum calorific value (apparently of 5 000 kJ/kg in France, between 9 500 kJ/kg and 15 000 kJ/kg in the Flemish region of Belgium, between 11 500 kJ/kg and 15 000 kJ/kg in the Netherlands and 21 000 kJ/kg in the United Kingdom).

46. It also refers to my Opinion in *Tombesi*, [37] where I referred to 'the Member States' need to lay down practical rules and guidelines for the day-to-day application of the Directive providing the necessary degree of legal certainty for individuals and stated: 'As the Directive stands at present, I think it must to some extent be left to Member States to develop more detailed criteria to apply the term recovery operation to the various situations which may occur in practice.'

47. In similar vein Germany refers to the Opinion of Advocate General Tesouro in *Commission v Council*, [38] which concerned the correct legal basis for Council Directive 91/156 [39] which substantially amended the original version of the Waste Directive. [40] The Advocate General stated:

[The Directive] sets out the broad lines of the action which the Member States are to take in order to ensure that waste management within the Community is conducted so as to guarantee protection for the environment and health. However, the Member States remain substantially free to define the content of that action and the means which they employ...

As regards in particular the conditions of competition, the directive does not ... lay down common rules relating to the activity of waste management, but merely defines the principles by which action by the Member States is to be guided. It follows that each Member State may adopt in *subiecta materia* the provisions which, in its view, are most appropriate for the purpose of attaining the prescribed objectives. Consequently, the rules on waste disposal and recycling may differ - even to a significant degree - from one Member State to another ...

48. In my view however the situation in *Tombesi* was different in a material respect from the present case: the question before the Court was whether certain substances including residues from production or consumption cycles constituted waste. In order to approach that question I considered, given the definition of waste in the Directive, that under the Directive 'the sole question is whether the substance in issue is subject to a disposal or recovery operation within the meaning of Annex IIA or B. [41] Since Italy had imposed additional criteria for the definition of waste which were not mentioned in the Directive, I stated in the paragraph following that relied on by Germany: 'It is in fact probably unnecessary in the present cases to determine the extent of any discretion left to the Member States since it is clear that the Italian decree-laws which prompted the national courts' questions are inconsistent with the Directive. [42] It is manifest therefore that - unsurprisingly - I was not suggesting that Member States had an unfettered discretion to delimit the notions of disposal and recovery. Where - as in *Tombesi* and, as I will suggest, as in the present case - national law or practice is manifestly inconsistent with the Directive, the question of discretion becomes irrelevant.'

49. As for the statements of Advocate General Tesouro in *Commission v Council*, it appears from a closer reading of his Opinion that he was considering the framework rules on national waste management proposed by the Directive and not the specific terms there defined: indeed he prefaces his discussion with the words 'If we now turn to its content, the directive [apart from defining the terms which determine its scope], establishes [43] The differences between Member States' practice to which the Advocate General alludes may be taken to concern national policies in the field of waste management, for example to encourage the reduction of waste production and its harmfulness and to encourage the recycling of waste. It must be borne in mind that *Commission v Council* was a challenge to the legal basis chosen by the Council for Directive 91/156, [44] and hence the discussion focused on the objectives of the legislation. There is nothing in the Opinion - or in the judgment of the Court - to suggest that the Advocate General envisaged Member States applying their own criteria to the disposal and recovery operations described in Annex IIA and IIB to the Directive.'

50. Germany also refers to the statement of the Court in *ARCO* [45] that:

'In the absence of specific Community provisions on proof of the existence of waste, it is for the national court to apply the provisions of its own legal system in that regard, while taking care that the objective and effectiveness of [the Waste Directive] are not undermined.'

51. That proposition cannot however be relevant to the present case given the existence in the Directive of 'specific Community provisions describing disposal and recovery operations. It may be noted that the Court in the immediately following paragraph stated that 'what is commonly regarded as waste ... is irrelevant in view of the express definition of waste in Article 1(a) of [the Waste Directive]. Contrary to Germany's view, therefore, the Court's statements in *ARCO* support the proposition that Member States may not further qualify definitions contained in the Directive.'

52. The unacceptable consequences of Member States' being permitted to apply their own criteria in such a way are evident from the diverse minimum calorific values which, according to Germany, certain Member States require of waste in order for its incineration with recovery of heat generated to be classified as a recovery operation under head R1 in Annex IIB to the Directive. As mentioned above, those calorific values range from 5 000 kJ/kg in France to 21 000 kJ/kg in the United Kingdom. The application by different Member States (and possibly different regions in the same Member State) of such wide-ranging thresholds would clearly run counter to the objectives of both the Directive, whose aims include a 'common terminology ... to improve the efficiency of waste management in the Community, (46) and the Regulation, which is built on the premiss that different Member States will apply the same procedures to waste intended for particular operations. As the Commission points out, if Member States were free to set their own divergent criteria determining which operations were to be classified as recovery operations, the impact of Article 7(4) of the Regulation, which exhaustively lists the cases in which Member States may object to shipments of waste for recovery, (47) would be much reduced.

53. That is not to say that a uniform criterion based on calorific value might not be a useful and workable means of distinguishing between recovery and disposal operations if set at Community level. However it appears that it has not been possible to agree such a criterion to date.

54. Both the Commission and Germany refer to a working document submitted by the Commission to the Technical Adaptation Committee in 1999 (48) pursuant to the Directive, which provides for the amendments necessary for adapting the Annexes to the Directive to scientific and technical progress to be adopted in accordance with a prescribed procedure involving a committee composed of representatives of the Member States. (49) That document put forward a number of suggestions for limiting movements of waste to be incinerated. One of the options considered was the development of criteria for distinguishing more clearly between 'Incineration on land under head D10 of Annex IIA and 'Use principally as a fuel or other means to generate energy under head R1 of Annex IIB. One of the criteria discussed was calorific value: it was suggested that a calorific value of 17 000 kJ/kg be used as a limit value. However, it appears that a distinction based on that calorific value was not accepted by the majority of Member States.
'Use ... as a fuel or other means to generate energy

55. Germany submits that 'Use ... as a fuel or other means to generate energy in the description in head R1 of Annex IIB to the Directive should be interpreted by reference to the objective of the operation. In order to constitute recovery, therefore, the specific aim of an incineration operation must be that the waste is used as a source of energy. Germany considers that that principle, which underlies the practice of the Länder at issue in the present proceedings, precisely reflects the criterion laid down by the Court in ASA, (50) which is also expressed in terms of the operation's principal objective.

56. The Commission in contrast considers that the decisive factor for the purpose of head R1 of Annex IIB to the Directive is that the waste is used as a fuel. Waste will be used as a fuel only if first its combustion generates thermic energy and second the energy so generated is actually used; the waste being burnt is therefore in fact replacing other sources of energy. If those conditions are not satisfied, there is no use as fuel but simply incineration. The Commission notes that the waste to be shipped consisted of mixed waste to be used as fuel in the Belgian cement industry. The waste is unquestionably to be used in Belgian cement factories in such a way that its combustion generates thermic energy which is actually used, replacing in one case up to one third of the energy from primary sources otherwise used and in the other case all such energy. The waste is accordingly intended to be used as a fuel. With regard to the judgment in ASA, the Commission refers to the Court's statement that 'the essential characteristic of a waste recovery operation is that its principal objective is that the waste serve a useful purpose in replacing other materials which would have had to be used for that purpose, thereby conserving natural resources. (51) It considers that, in the light of its analysis summarised above, that criterion applied to the present case leads ineluctably to the conclusion that the use of mixed waste in cement factories must be classified as a recovery operation.

57. The Commission's analysis appears to me to be sound. As a matter of common sense and on a natural reading of the description, 'Use ... as a fuel or other means to generate energy must involve the two criteria the Commission proposes. First, if the incineration of waste does not generate more energy than it consumes - for example because the waste in question is not easily combustible, so that more energy is required to ignite it and/or keep it burning than is generated by the incineration itself - there will be no surplus energy available as a fuel. Second, even if surplus energy is generated the waste cannot be regarded as being used as a fuel or other means to generate energy unless that energy is itself used. The concept of using

waste as a fuel or other means to generate energy thus inevitably entails that, to the extent to which it is so used, it replaces energy from primary sources. That is clearly consistent with the notion of recovery.

58. Moreover the principal objective of an incineration operation which is an integral part of an industrial process and which generates surplus energy to be used in that industrial process may be said to be the use of the waste as a fuel. Since the use of waste in such a way will evidently replace other fuel, natural resources will be conserved. So interpreted, the description in head R1 of Annex IIB to the Directive may therefore be seen as an application of the criterion laid down by the Court in ASA, [52] namely that the principal objective of a recovery operation is that the waste serve a useful purpose in replacing other materials which would have had to be used for that purpose, thereby conserving natural resources. As I suggested in my Opinion in that case, the decisive question is whether the waste is used for a genuine purpose: if it were not available for a given operation, would that operation none the less be carried out using some other material? [53] In the case of waste used as fuel for a cement factory, the answer to that question is clearly 'yes': in the absence of available waste, the factory would still operate using other fuel.

59. It is instructive to contrast the present case with *Commission v Luxembourg*, [54] another action for infringement which concerns proposed shipments of household waste for incineration with incidental recovery of the energy generated. In my Opinion also delivered today I state that, in the case of waste being incinerated in a plant developed for that purpose, the answer to the question set out above is clearly 'no': in the absence of available waste, there would be no incineration. In those circumstances it would not be right to describe the operation as recovery simply because, whenever waste is available and incinerated, the heat generated by the incineration is used, wholly or partly, as a means to generate energy. That fact does not of itself make the principal objective of the incineration the use of the waste as a fuel or other means to generate energy.

60. In the present case it appears [55] furthermore that the complaints to the Commission which ultimately prompted the present action for infringement were made by the cement manufacturers. It may be assumed therefore that it was advantageous to those manufacturers that the waste should be shipped, which also suggests that the principal objective of the operations at issue is the use of the waste as fuel. The fact that the cement manufacturers lodged complaints illustrates the adverse consequences both for the free movement of goods and for the Community's environmental policy which would flow from an interpretation of the legislation to the effect that operations such as those at issue were correctly classified as disposal. The Member State of dispatch would then be able - as Germany apparently wishes - to prohibit shipments of the waste on the basis of proximity and/or self-sufficiency; manufacturers in other Member States would be prevented from saving natural resources by using the waste as fuel in an industrial process and thereby contributing to the objective of prudent and rational utilisation of natural resources enshrined in Article 174 EC.

61. As the Court noted in *Dusseldorp*, [56] it was in order to encourage recovery in the Community as a whole, in particular by the development of the most efficient technologies, that the Community legislature stipulated that waste for recovery should be able to move freely between Member States for processing. Admittedly, the Court added the proviso that the transport should pose no threat to the environment. That proviso cannot however in my view be understood in absolute terms, since virtually all methods of transport currently involve some risk to the environment. I understand the Court rather to have been imposing a balancing exercise. As I noted in my Opinion in that case, the environmental arguments are much more finely balanced where the waste to be shipped is for recovery than where it is for disposal: while the transport of waste over distance may, depending on the type of waste, entail certain environmental risks, a single market in waste for recovery is likely to improve recycling, thereby reducing the volume of waste for disposal and conserving primary raw materials. [57]

62. Again the contrast with *Commission v Luxembourg* is useful: in that case, where the objective of the operation at issue is primarily to dispose of the waste, it seems reasonable that the imperative of environmental protection should override the imperative of the free movement of goods, whereas in the present case, where the objective is to use the waste to fuel a manufacturing process thus sparing natural resources, the converse is true. Quantitative criteria - the meaning of 'principally

63. Even though it is not in my view lawful for Member States to superimpose further criteria on the description of the recovery operation in head R1 of Annex IIB to the Directive, 'Use principally as a fuel or other means to generate energy, Germany's submissions as to the lawfulness of the criteria it has laid down remain potentially relevant since it considers that the criterion of minimum calorific value correctly translates the requirement of 'principal use. It submits that the concept of principal use requires that the principal objective of the operation

be the recovery of energy. A use in which the waste is not principally used as a fuel but simply burned does not suffice: in order for the definition in head R1 to be satisfied, the greater part of the waste must be used as a source of energy. According to Germany's calculations, that occurs in general only when the calorific value of 11 000 kJ/kg is reached. Almost all incineration operations make some further use of the heat released: if that fact alone meant that the operation were recovery, virtually all incineration would be recovery.

64. The Commission repeats that the only quantitative element in the definition in head R1 is the requirement that the waste must be principally used, which means that the greater part of the waste must be used as fuel. An operation in which only a minor portion of the waste is burned with use of the heat generated, while the major portion is recovered in another way, would not therefore be classified under head R1 of Annex IIB to the Directive.

65. The Commission's view to my mind is consistent with the wording of Annex IIB. All the language versions of head R1 except the Greek version reflect the requirement that the use must be principally as a fuel or, in slightly different words, that the principal use must be as fuel. If only a minor portion of a consignment of waste is burned with use of the heat generated, the operation evidently cannot be regarded as constituting 'use principally as a fuel or other means to generate energy. In order to fall within the description in head R1, the consignment as a whole must be 'principally used.

66. Germany objects that the effect of that interpretation is that an operation will constitute recovery provided that a mere 51% of the waste is to be burned and the energy generated is to be used. It is not however the case that the Member State of dispatch must authorise all shipments of waste intended for such an operation. If the unincinerated portion of the waste is not itself to be recovered, the Member State of dispatch may be entitled to object to its shipment on the basis of the fifth indent of Article 7(4)(a) of the Regulation, which concerns the situation where 'the ratio of the recoverable and non-recoverable waste, the estimated value of the materials to be finally recovered or the cost of the recovery and the cost of the disposal of the non-recoverable fraction do not justify the recovery under economic and environmental considerations. The Member State of dispatch will be in a position to make such an assessment since in accordance with the Regulation the consignment note must include information with regard to the planned method of disposal for the residual waste after recycling has taken place, the amount of the recycled material in relation to the residual waste and the estimated value of the recycled material. (58)

67. As discussed above, waste can be regarded as used as a fuel or other means to generate energy only where the operation results in a net production of energy and that energy is actually used. The requirement that the waste be 'principally used as such applies in my view to both those elements of the definition. Thus not only must the greater part of a consignment of waste be burnt in a given incineration operation, the operation will not be recovery unless the energy generated is itself 'principally used.

68. Provided that those conditions are satisfied, it seems to me that the requirements of head R1 in Annex IIB to the Directive are met and the operation will be a recovery operation. There is thus no need for presumptions involving the calorific value of the waste etc. As the Court stated in ASA (59) in the context of the correct classification of the deposit of waste in a disused mine, the competent authorities must assess proposed shipments of waste on a case-by-case basis. That principle appears to me to be equally applicable in cases such as the present: in order to determine whether the conditions discussed above are satisfied with regard to a given shipment of waste, the authorities will inevitably have to assess each case individually. The use of general presumptions however clearly conflicts with such an approach.

The status of mixed waste

69. Germany submits that, in order to determine whether mixed waste is to be genuinely recovered, the qualities of the constituent individual wastes must be considered and not the mixture itself. (60) That, it states, accords with the practice of the majority of the Member States. Germany argues that if mixed waste includes waste the incineration of which could not be regarded as a recovery operation either because it would not if burned alone generate surplus heat or because it would not burn at all, the incineration of that mixed waste cannot be so regarded either but is correctly to be classified as disposal. That point is illustrated by the example given by Germany: various sludges (sludges from cleaning tanks and washing vats, colorant and shellac sludges and phenol sludges) contained in the mixed waste at issue consist of at least 75% water, which does not burn, but evaporates because it is combined with inflammable substances which burn at a temperature sufficient to heat water. Germany argues that the 'incineration of individually unflammable waste is not therefore a 'means to generate energy but on the contrary uses the energy generated by the other waste with which it is combined.

70. In my view however that argument does not take the matter much further: if in fact there is a net energy gain from the incineration of mixed waste and that energy is recovered, the operation is a recovery operation in accordance with head R1 of Annex IIB to the Directive. I do not see why that conclusion should be different merely because individual constituent parts of the waste would, if burned separately, not react in the same way. What is relevant is that the less inflammable waste, as a result of being mixed with more inflammable waste, in fact burns and the energy generated by the combined incineration is used.

71. Germany adds that if it is sufficient that the mixture alone, rather than the component elements, satisfy the definition of the operation in head R1 of Annex IIB to the Directive, the strict separation laid down by the Regulation between waste intended for disposal and waste intended for recovery would become impossible: all waste in fact unsuitable for use as a fuel and hence fit only for disposal could be simply mixed with waste which was so suitable; the first waste would thereby also be regarded as for recovery and thus escape the provisions of the Regulation applicable to waste for disposal. That argument however is also flawed: if those wastes not incinerable on their own are mixed with other, more inflammable, waste and the resulting mixture is in fact to be used principally as a fuel, it is surely appropriate that a shipment of such a mixture should be treated as a shipment of waste for recovery.

72. I accordingly do not accept Germany's submission that components of mixed waste must be assessed individually in order to determine whether the operation to which they are intended to be subjected is a recovery or a disposal operation.
Waste containing hazardous or harmful elements

73. Germany submits that, to the extent that components of the mixed waste constitute hazardous waste within the meaning of Council Directive 91/689/EEC on hazardous waste, (61) mixing them with other waste is contrary to Article 2(2) of that directive, which provides:
'Member States shall take the necessary measures to require that establishment[s] and undertaking[s] which dispose of, recover, collect or transport hazardous waste do not mix different categories of hazardous waste or mix hazardous waste with non-hazardous waste.

74. However, mixing waste contrary to the provisions of Directive 91/689 cannot affect the meaning of 'recovery and 'disposal for the purpose of the Waste Directive and of the individual operations listed in Annex IIA and IIB thereto. That view is supported by Article 1(3) of Directive 91/689, which states that the definition of 'waste and the other terms used therein - which include 'recovery and 'disposal - are to be those in the Waste Directive.

75. If Germany has reason to fear that hazardous and non-hazardous wastes are being mixed contrary to the terms of the Hazardous Waste Directive, it must take the necessary measures as required by that directive to ensure that such practices are brought to an end.

76. The criteria laid down by the Länder concerned include the nature and quantity of polluting substances in the waste mixture: if the concentration of certain substances is above a prescribed threshold, incineration of the waste will be regarded as disposal. Germany explains first that this is because - as is clear from the note introducing Annex IIB to the Directive (62) - recovery operations must be harmless and compatible with the environment. However since the note introducing Annex IIA (63) governing disposal is in identical terms, that criterion alone cannot help to distinguish recovery and disposal operations.

77. Germany adds that the network of disposal installations required to be established by the Directive must enable waste to be disposed of 'by means of the most appropriate methods and technologies in order to ensure a high level of protection for the environment and public health in accordance with Article 5(2) of the Directive. Recovery installations on the other hand do not always have in all Member States an equivalent level of technology. Member States may therefore impose a criterion of harmful content to distinguish between waste for disposal and waste for recovery and hence to ensure that waste containing harmful substances is disposed of in accordance with Article 5(2).

78. I cannot accept that argument.

79. First, Article 4(1) of the Directive imposes a general requirement on Member States to take the necessary measures to ensure that waste is recovered or disposed of 'without endangering human health and without using processes or methods which could harm the environment; again, therefore, there is no basis for a distinction between waste for recovery and waste for disposal by reference to different levels of environmental regulation of recovery and disposal operations.

80. Second, harmonised standards for air pollution from waste incineration plants are set throughout the Community, currently by Directives 89/369 (64) and 89/429, (65) to be replaced in due course by Directive 2000/76. (66) In those circumstances, Germany cannot prevent the shipment of waste on the basis of alleged lesser compliance with those norms by other Member States. (67) That applies even though Germany may in accordance with the Directives and Article 176 EC maintain or introduce measures for the protection of the environment more stringent than those there laid down: (68) the Court has recently ruled that a Member State may not subject the shipment of waste for disposal to the condition that the intended disposal satisfy the requirements of the environmental protection legislation of the Member State of dispatch, (69) and it is clear from the terms of that judgment and the scheme of the Regulation that that principle will apply a fortiori to any analogous objection to the shipment of waste for recovery.

81. Third, the Court made it clear in ASA (70) that 'it does not follow from ... the Directive that the hazardous or non-hazardous nature of the waste is, of itself, a relevant criterion for assessing whether a waste treatment operation must be classified as recovery. There is nothing to suggest that that proposition will not be equally applicable where it is the allegedly harmful nature of individual components of mixed waste, rather than the fact that the waste as a whole is hazardous waste, which is at issue.

82. Finally, the Directive itself envisages that waste destined for recovery may contain dangerous substances: the third indent of Article 3(1)(a) requires Member States to take appropriate measures to encourage 'the development of appropriate techniques for the final disposal of dangerous substances contained in waste destined for recovery.

83. For those reasons also I cannot accept Germany's further argument that, since certain other Community waste instruments regulate the extent to which specific types of harmful waste may be recovered rather than disposed of, the harmful content of individual components of mixed waste is a lawful general criterion which Member States may impose for distinguishing between waste for disposal by incineration and waste for recovery by use as a fuel.

84. I accordingly do not accept that the hazardous or harmful nature of elements of mixed waste is relevant to determining whether the waste should be classified as waste for recovery or waste for disposal.

Conclusion

85. I am accordingly of the opinion that the Court should:

- (1) declare that, by raising objections on the ground of self-sufficiency in the disposal of waste to shipments of waste to other Member States to be used principally as a fuel, the Federal Republic of Germany has failed to fulfil its obligations under Article 7(2) and (4) of Council Regulation [EEC] No 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into and out of the European Community;
- (2) order the Federal Republic of Germany to pay the costs.
 - 1: - Original language: English.
 - 2: - OJ 1993 L 30, p. 1.
 - 3: - OJ 1975 L 194, p. 39, as amended by Council Directive 91/156/EEC of 18 March 1991, OJ 1991 L 78, p. 32, and by Council Directive 91/692/EEC of 23 December 1991, OJ 1991 L 377, p. 48.
 - 4: - Article 1(e).
 - 5: - Article 1(f).
 - 6: - As adapted by Commission Decision 96/350/EC of 24 May 1996 adapting Annexes IIA and IIB to Council Directive 75/442/EEC on waste, OJ 1996 L 135, p. 32.
 - 7: - Which requires Member States to take the necessary measures to the same effect.
 - 8: - Case C-187/93 Parliament v Council [1994] ECR I-2857, paragraph 26 of the judgment.
 - 9: - Article 2(i) and (k).
 - 10: - As adapted by Commission Decision 94/721/EC of 21 October 1994 adapting, pursuant to Article 42(3), Annexes II, III and IV to Council Regulation [EEC] No 259/93 on the supervision and control of shipments of waste within, into and out of the European Community, OJ 1994 L 288, p.36.
 - 11: - Recital 14 in the preamble to the Regulation.
 - 12: - Articles 1(3) and 11 of the Regulation.
 - 13: - Article 2(g).
 - 14: - And, if relevant, of transit.
 - 15: - Articles 3(1) (waste for disposal) and 6(1) (waste for recovery).
 - 16: - Articles 3(3) and 6(3).
 - 17: - Articles 3(4) and 6(4).
 - 18: - Articles 3(5) and 6(5), first and fifth indents.
 - 19: - Article 6(5), sixth, seventh and eighth indents.
 - 20: - And, if relevant, of transit.
 - 21: - Articles 4(1) and 4(2).

- 22: - And, if relevant, of transit.
- 23: - Where the waste is listed in Annex IV or has not been assigned to Annex II, III or IV, the competent authorities concerned must give their consent in writing (Article 10).
- 24: - Article 7(1) and (2).
- 25: - Article 4(2)(c).
- 26: - Article 4(3)(a)(i).
- 27: - Article 4(3)(b)(i).
- 28: - Article 7(2).
- 29: - Article 7(4)(b) concerns the objections which may be raised by the competent authorities of transit, not relevant to the present case.
- 30: - Case C-203/96 [1998] ECR I-4075, paragraphs 33 and 34 of the judgment.
- 31: - Case C-6/00, paragraph 69 of the judgment delivered on 27 February 2002.
- 32: - Paragraph 36 of the judgment.
- 33: - In fact at the time of the circulars, Annex IIB to the Directive had not been adapted by Commission Decision 96/350, cited in note 6. The operation now described under head R1 was then mentioned under head R9; in the German version, moreover, although not in the French or English, the wording was 'Use as a fuel (other than in direct incineration). Germany however refers throughout its pleadings to the current version of Annex IIB, recognising that the difference in the two German versions was the result of a drafting error.
- 34: - Case C-365/97 Commission v Italy [1999] ECR I-7773, paragraph 23 of the judgment.
- 35: - Case 211/81 Commission v Denmark [1982] ECR 4547, paragraph 8 of the judgment.
- 36: - Joined Cases 142/80 and 143/80 Essevi and Salengo [1981] ECR 1413, paragraph 15 of the judgment.
- 37: - Joined Cases C-304/94, C-330/94, C-342/94 and C-224/95 Tombesi [1997] ECR I-3561, paragraph 56 of the Opinion.
- 38: - Case C-155/91 [1993] ECR I-939, paragraphs 8 and 9 of the Opinion.
- 39: - Cited in note 3.
- 40: - Directive 75/442, cited in note 2.
- 41: - Paragraph 57 of the Opinion.
- 42: - Ibidem.
- 43: - Paragraph 8; emphasis in original.
- 44: - Cited in note 3.
- 45: - Joined Cases C-418/97 and C-419/97 ARCO Chemie Nederland [2000] ECR I-4475, paragraph 70 of the judgment.
- 46: - See the third recital in the preamble to Directive 91/156, cited in note 3.
- 47: - ASA, cited in note 31, paragraph 36 of the judgment.
- 48: - 28 January 1999, XIE3/KW D(99).
- 49: - Articles 17 and 18.
- 50: - Cited in note 31, paragraph 69 of the judgment.
- 51: - Paragraph 69 of the judgment.
- 52: - Cited in note 31, paragraph 69 of the judgment.
- 53: - Paragraph 86.
- 54: - Case C-458/00, paragraph 42 of the Opinion.
- 55: - According to Germany's representative at the hearing.
- 56: - Cited in note 30, paragraph 33 of the judgment.
- 57: - Paragraph 61.
- 58: - Sixth, seventh and eighth indents in Article 6(5).
- 59: - Cited in note 31, paragraph 71 of the judgment.
- 60: - This appears to be feasible, since the first indent of Article 6(5) of the Regulation requires the consignment note to include information concerning 'the source, composition and quantity of the waste for recovery ... and, in the case of waste from various sources, a detailed inventory of the waste.
- 61: - Directive of 12 December 1991, OJ 1991 L 377, p. 20.
- 62: - Set out in paragraph 6 above.
- 63: - See paragraph 6 above.
- 64: - Council Directive 89/369/EEC of 8 June 1989 on the prevention of air pollution from new municipal waste incineration plants, OJ 1989 L 163, p. 32.
- 65: - Council Directive 89/429/EEC of 21 June 1989 on the reduction of air pollution from existing municipal waste-incineration plants, OJ 1989 L 203, p. 50.
- 66: - Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste, OJ 2000 L 332, p. 91.
- 67: - See for example Case C-5/94 Hedley Lomas [1996] ECR I-2553, paragraph 20 of the judgment and the cases there cited.
- 68: - Final recital in the preamble to each directive.
- 69: - Case C-324/99 DaimlerChrysler [2001] ECR I-9897, paragraphs 48 to 65 of the judgment.
- 70: - Cited in note 31, paragraph 68 of the judgment.

ENDNOTES

- ¹ DOEHLG (2006) National Biodegradable Waste Strategy. April 2006.
- ² DOEHLG (2006) Consultation Paper: Regulation of the Waste Management Sector.
- ³ EPA Office of Environmental Enforcement (2005) The Nature and Extent of Unauthorised Waste Activity in Ireland, Wexford, Ireland: EPA. The EPA gives a figure of 32 for 2005 (EPA (2006) National Waste Database Report 2005).
- ⁴ From EPA (2003) National Waste Database Report 2001. EPA (2006) National Waste Database Report 2005.
- ⁵ DOELG (1998) Waste Management: Changing our Ways. September 1998.
- ⁶ EPA (2003) National Waste Database Report 2001.
- ⁷ EPA (2005) National Waste Database Report 2004.
- ⁸ Waste Management (Collection Permit) Regulations 2001, S. I. No 402 of 2001, <http://www.irishstatutebook.ie/ZZSI402Y2001.html>
- ⁹ EPA (2004) National Waste Database Report 2003.
- ¹⁰ EPA (2005) National Waste Database Report 2004.
- ¹¹ EPA (2005) National Waste Database Report 2004.
- ¹² Forfas (2006) Waste Management Benchmarking Study: A Baseline Assessment. Later in the same document, having cautioned readers on the non-comparability of the data on municipal waste, the report states: 'The high level of consistent data available on the municipal waste stream enables an accurate picture of the current treatment solutions in place in each country.'
- ¹³ DOELG (1998) Waste Management: Changing our Ways. September 1998.
- ¹⁴ This does not state whether this is total waste or municipal waste.
- ¹⁵ DOELG (2002) Preventing and Recycling Waste: Delivering Change. March 2002.
- ¹⁶ DOEHLG (2004) Managing Waste: Taking Stock & Moving Forward. April 2004.
- ¹⁷ DOEHLG (2004) Delivering Value For People – Service Indicators In Local Authorities, January 2004.
- ¹⁸ DOEHLG (2006) National Biodegradable Waste Strategy. April 2006.
- ¹⁹ Forfas (2006) Waste Management Benchmarking Study: A Baseline Assessment.
- ²⁰ EPA (2003) National Waste Database Report 2001.
- ²¹ EPA (2005) National Waste Database Report 2004.
- ²² This report was being finalised at the time the EPA released its National Waste Database Report 2005. The EPA itself has clearly sought to audit some of the returns it has received, and has made adjustments to data accordingly. This appears to be broadly in line with what is suggested here.
- ²³ DOELG (2002) Preventing and Recycling Waste: Delivering Change. March 2002, p.3.
- ²⁴ DOEHLG (2004) Managing Waste: Taking Stock & Moving Forward. April 2004.
- ²⁵ DOEHLG (2004) Managing Waste: Taking Stock & Moving Forward. April 2004.
- ²⁶ DOEHLG (2004) Managing Waste: Taking Stock & Moving Forward. April 2004.
- ²⁷ DOEHLG (2004) Draft National Biodegradable Waste Strategy. 2004
- ²⁸ Although, as we highlight in Section 5.2, consideration of the possibility for directing waste to specific facilities is under way, and this might – if it was deemed legal, and under EU law, this is not clear – have the effect of directing the requisite quantity of waste into specified facilities. Even in this case, if excess capacity was in place, the conundrum as to how much waste should be directed to which facility would remain (and be potentially more problematic if there was 'not enough waste to go round'.
- ²⁹ DOEHLG (2004) Draft National Biodegradable Waste Strategy. 2004

- ³⁰ DOEHLG (2004) National Overview of Waste Management Plans, April 2004.
- ³¹ Waste Management (Planning) Regulations 1997, S. I. No. 137 of 1997.
- ³² DOEHLG (2004) Managing Waste: Taking Stock & Moving Forward. April 2004.
- ³³ Limerick Clare Kerry: Draft Replacement Waste Management Plan 2006-2011 <http://www.managewaste.ie/docs/2006/Waste%20Management%20Plan%20PKing%20%2024th%20May%202006.pdf>
- ³⁴ Targets from national documents. Statement in county plan is to 'endeavour to reach the recycling targets set within the scope of the Government's policy documents 'Changing Our Ways' & 'Delivering Change' and those set within the scope of the Waste Management Strategy for the Cork Region.'
- ³⁵ RPS MCOS (2004) Proposed Waste Management Plan for Cork County: Submission by Indaver Ireland, prepared by RPS MCOS, May 2004
- ³⁶ DOEHLG (2006) National Biodegradable Waste Strategy. April 2006.
- ³⁷ See, for example, Office for Government Commerce (u.d.) Frequently Asked Questions, http://www.ogc.gov.uk/documents/Kelly_FAQ_PDF.pdf
- ³⁸ Defra (2004) Explanatory Memorandum to the Landfill (Maximum Landfill Amount) (Northern Ireland) Regulations 2004, http://www.opsi.gov.uk/si/si2004/draft/em/uksidem_0110499425_en.pdf
- ³⁹ Scottish Executive (2003) Reducing Landfill: A Landfill Allowance Scheme Consultation, December 2003, <http://www.scotland.gov.uk/Resource/Doc/47043/0030039.pdf>
- ⁴⁰ See Stefano Proietti (2000) The Application of local Taxes and Fees for the Collection of Household Waste: Local Authority Jurisdiction and Practice in Europe, Report for the Association of Cities for Recycling, Brussels: ACR; Eunomia (2003), Waste Collection: To Charge or Not to Charge? A Final report to IWM (EB), <http://www.eunomia.co.uk/Charging%20report.pdf>.
- ⁴¹ See Eunomia (2003), Waste Collection: To Charge or Not to Charge? A Final report to IWM (EB), <http://www.eunomia.co.uk/Charging%20report.pdf>; D. Hogg (2006) Impact of Unit-based Waste Collection Charges ENV/EPOC/WGWPR(2005)10/FINAL, Paris: OECD.
- ⁴² OEE 2005 indicates that the average price of landfill disposal has risen from typically €10 per tonne in 1996 to in the region of €150 per tonne in 2004, and in one case is €240 per tonne [see EPA Office of Environmental Enforcement (2005) The Nature and Extent of Unauthorised Waste Activity in Ireland, Wexford, Ireland: EPA].
- ⁴³ John FitzGerald and Edgar Morgenroth (2006) Ex-Ante Evaluation of the Investment Priorities for the National Development Plan 2007-2013, ESRI Report Commissioned by Department of Finance, October 2006.
- ⁴⁴ John FitzGerald and Edgar Morgenroth (2006) Ex-Ante Evaluation of the Investment Priorities for the National Development Plan 2007-2013, ESRI Report Commissioned by Department of Finance, October 2006.
- ⁴⁵ Houses of the Oireachtas Joint Committee on the Environment and Local Government (2006) Recycling of Household Waste in Ireland, September 2006.
- ⁴⁶ DOEHLG (2006) Consultation Paper: Regulation of the Waste Management Sector.
- ⁴⁷ Even in these situations, it may be difficult to ensure that a 'pro-recycling' collection culture is assured for the simple reason that scope and frequency of collection does not go far enough in terms of ensuring quality of service.
- ⁴⁸ Indecon International in association with the Institute of Local Government Studies at University of Birmingham (2006) Indecon Review of Local Government Financing, Report Commissioned by the Minister for the Environment, Heritage and Local Government
- ⁴⁹ DOEHLG (2006) Consultation Paper: Regulation of the Waste Management Sector.
- ⁵⁰ DOEHLG (2006) Consultation Paper: Regulation of the Waste Management Sector.
- ⁵¹ John FitzGerald and Edgar Morgenroth (2006) Ex-Ante Evaluation of the Investment Priorities for the National Development Plan 2007-2013, ESRI Report Commissioned by Department of Finance, October 2006.
- ⁵² John FitzGerald and Edgar Morgenroth (2006) Ex-Ante Evaluation of the Investment Priorities for the National

Development Plan 2007-2013, ESRI Report Commissioned by Department of Finance, October 2006.

⁵³ Forfas (2001) Key Waste Management Issues in Ireland, December 2001.

⁵⁴ SLR (2005) Delivering Key waste Management Infrastructure: Lessons Learned from Europe, Final Report to CIWM, November 2005.

⁵⁵ 'The fly ash and the flue gas cleaning residues are toxic and must be managed as hazardous waste. From the Dublin facility it is planned to ship these substances for treatment and safe depositing in licensed facilities in Norway or Germany' http://www.dublinwastetoenergy.ie/files/proposed_plant.pdf

⁵⁶ This is taken up in more detail in Section 6.2.2 below. There is some difference of opinion between commentators and those involved regarding whether, and if so, how, a mechanism for distinguishing between 'recovery and 'disposal' should be included within the proposed Waste Framework Directive.

⁵⁷ Judgment of the Court (Fifth Chamber) of 13 February 2003 in Case C-458/00: Commission of the European Communities v Grand Duchy of Luxembourg. Official Journal of the European Union, C83, p.2, 5 April 2003. Opinion of Advocate General Jacobs Delivered on 26 September 2002 in Case C-228/00, Commission of the European Communities v Federal Republic of Germany.

⁵⁸ It must be noted that the latest plan in place for the Cork Region was developed by Cork City Council as a City Council Plan. It updates the 1995 joint plan developed by the City and County Councils in conjunction. As such, the main thrust of the reviewed plan focuses upon issues for the city alone. Rather than developing its own plan for the more rural regions, Cork County Council has merely adopted the principals of the City Plan. This City Plan however shows little obvious development upon the 1995 County Plan.

⁵⁹ An Bord Pleanála (2004) Board Direction, Ref 04.131196, 15 January 2004, <http://www.pleanala.ie/DCT/131/S131196.DOC>.

⁶⁰ EirGrid (2006) Generation Adequacy Report 2007-2013, November 2006

⁶¹ DOEHLG (2006) Ireland's Pathway to Kyoto Compliance: Review of the National Climate Change Strategy, July 2006

⁶² SEI (2006) Energy in Ireland 1990 – 2005, November 2006

⁶³ This is rarely achieved today but might be more common at the time any facility is built. A recent report for CEWEP indicates that for a sample of 28 plants producing mainly electricity, the net electricity generation averaged 17.7% with 2.6% of heat energy exported. For electricity generation, plants generating mainly electricity exhibited a range in their efficiencies of net export from 8.4% to 24.3% (see Dieter O Reimann (2006) Results of Specific Data for Energy, Efficiency Rates and Coefficients, Plant Efficiency factors and NCV of 97 European W-t-E Plants and Determination of the Main Energy Results, Report to CEWEP, Updated July 2006). Consequently, our use of the 25% figure is almost certainly over-generous for 'electricity only' facilities.

⁶⁴ Eunomia (2006), A Changing Climate for Energy from Waste? Final Report for Friends of the Earth, May 2006.

⁶⁵ David Davies (2003) Exploding Some Myths: Smoke and Mirrors in Waste Management Performance, Presentation to the Parliamentary Sustainable Waste Group/ ESA Conference, House of Commons, 28 January 2003.

⁶⁶ David Davies (2003) Exploding Some Myths: Smoke and Mirrors in Waste Management Performance, Presentation to the Parliamentary Sustainable Waste Group/ ESA Conference, House of Commons, 28 January 2003.

⁶⁷ It is worth noting that the throughput of any incinerator is effectively determined by the thermal capacity of the boiler. This means that as the calorific value of the input waste falls, so the potential throughput of the facility can increase consistent with the rating of the boiler. Incinerators are not power stations. The economics of incineration, from the perspective of an operator, will improve as the throughput increases since, unless the energy delivered is exceptional, and unless there is considerable support for energy from incineration, the revenues are usually determined more by gate fees than by sales of energy.

⁶⁸ See, for example, Environmental Assessment Institute (2005) Rethinking the Waste Hierachy, EAI: Copenhagen, and particularly Dijkgraaf, E. and H. Vollebereggh (2005) Literature Review of Social Costs and Benefits of Waste Disposal and Recycling, in Environmental Assessment Institute Rethinking the Waste Hierachy, EAI: Copenhagen, pp. 80-98.

⁶⁹ Judgment of the Court (Fifth Chamber) of 13 February 2003 in Case C-458/00: Commission of the European Communities v Grand Duchy of Luxembourg. Official Journal of the European Union, C83, p.2, 5 April 2003. Opinion of Advocate General Jacobs Delivered on 26 September 2002 in Case C-228/00, Commission of the European Communities v Federal Republic of Germany.

⁷⁰ Annex I (General Requirements for All Classes of Landfill), para. 4.2, Council Directive 1999/31/EC of 26 April 1999, on the Landfill of Waste.

⁷¹ Defra and Welsh Assembly (2003) Consultation Paper on Changes to the Packaging Regulations, July 2003.

⁷² It is not clear, however, whether this 'accepted view' has any formal status (and hence, whether it ought to be accepted, and under what conditions).

⁷³ A BREF note is a Best Available Technique Reference Document. These documents are produced by the European Integrated Pollution Prevention and Control Bureau and Member States are required to take these into account when determining Best Available Techniques (BAT) in their own country. A description of BAT is required for processes subject to the IPPC Directive 96/61/EC, including incineration.

⁷⁴ These are quite apart from the technical ones – why municipal waste only? Why is it that the delivery of electricity factored up by 2.6, but the use of electricity is not? Why is there a need for a factor to deal with losses to bottom ash and radiation? (Why not simply set an overall criteria where these are not allowed for explicitly?) Why does Ep speak only of 'energy produced' (and produced where? Many plants generating heat do not always have a year-round outlet for the use of the heat energy)? Over what period will the efficiency be measured? (What happens if a plant is above for some of the year and below for the rest?).

⁷⁵ CEWEP (2006) Statement on the Waste Framework Directive, Brussels, 23rd February 2006, http://www.cewep.com/storage/med/media/statements/66_CEWEPstatement.pdf?fCMS=816af985d0828c7799a40c92e62fd11d

⁷⁶ FEAD (2006) Position Paper: Revision Of The Waste Framework Directive, Commission Proposal of 21 December 2006, April 2006 http://www.fead.be/docs/FEAD_Position_Paper_WFD_130406.pdf

⁷⁷ European Commission (2005) Integrated Pollution Prevention and Control: Reference Document on the Best Available Techniques For Waste Incineration, July 2005

⁷⁸ NCV is the net calorific value of waste. The energetic content of waste is measured usually by one of two measures, the gross calorific value and the net calorific value. The net calorific value effectively takes into account the energy used in driving off moisture from waste in combustion processes. It is usually, therefore, a better indicator of what energy can be derived from waste combustion, and hence it is the more commonly use measure.

⁷⁹ See the consolidated text of the Directive http://www.europa.eu.int/eur-lex/en/consleg/pdf/1994/en_1994L0062_do_001.pdf

⁸⁰ These comments were correct as of December 2006.

⁸¹ See, for example, Brisson, I. E., (1997) Assessing the Waste Hierarchy – a Social Cost-Benefit Analysis of Municipal Solid Waste Management in the European Union, <http://www.akf/eng/waste1.htm>; Brisson, Inger, and Jane Powell (1995) Dump or burn? – the assessment of social costs and benefits of waste disposal, CSERGE, University College of London and University of East Anglia; Coopers & Lybrand, CSERGE and EFTEC (1997) Cost-Benefit Analysis of the Different Solid Waste Management Systems: Objectives and Instruments for the Year 2000, Luxembourg: Office for Official Publications of the European Communities.); Broome, E., P. Vaze and D. Hogg (1999) Beyond the bin: the economics of recycling, Final Report to Waste Watch; COWI (2000) External Costs of Landfill and Incineration, Final Report to the European Commission; Hogg, D. et al (2002) Economic assessment of options for dealing with biodegradable waste, Report to DG Environment, European Commission, by Eumonia, Scuola Agraria del Parco di Monza, HDRA Consultants, ZREU and LDK; Nolan ITU (2004) TBL Assessment of garden organics management, Final Report to the NSW Dept of Environment and Conservation, Sustainability Programs Division, May 2004. Dijkgraaf, E. and H. Vollebereggh (2005) Literature review of social costs and benefits of waste disposal and recycling, in EAI (2005) Rethinking the Waste Hierachy, EAI: Copenhagen, pp. 80-98; Dijkgraaf, E., and H. Vollebergh (2004) Burn or bury? A social cost comparison of final waste disposal methods, Ecological Economics, 50, pp.233-247; Döberl, G.; Huber, R.; Brunner, P. H.; Eder, M.; Pierrard, R.; Schönböck, W.; Frühwirth, W. and Hutterer, H. (2002) Long-term assessment of waste management options - a new, integrated and goal-oriented approach, Waste Management & Research, 20 (4), pp. 311-327; Sundqvist, J.-O. et al (2002) Hur skall hushallsavfallet tas omhand – utvärdering av olika behandlingsmetoder (How shall municipal solid waste be disposed – assessment of different treatment methods) Stockholm February 2002. IVL report B 1462; HM Customs & Excise (2004) Combining The Government's Two Heath And Environment Studies To Calculate Estimates For The External Costs Of Landfill And Incineration, December 2004; Bartelings, H., P. van Beukering, O. Kuik, V. Linderhof, F. Oosterhuis, L. Brander and A. Wagtendonk (2005) Effectiveness of Landfill Taxation, R-05/05, Report Commissioned by Ministerie von VROM, November 24, 2005

⁸² D. Jensen and N. Dengsoe (2004) Værdisætning af skadesomkostninger ved affaldsforbrænding - en analyse af dioxinens skadelige effekter og et egneeksempel på disse effekters samfundsmæssige økonomiske omkostninger, TemaNord 2004:518, Copenhagen, Nordic Ministry.

⁸³ Some take these ranges to be evidence of some shortcoming in the methodological approach, and we have heard some give this as a reason why they prefer life-cycle assessment over cost-benefit approaches. But if LCAs

appear to give a more certain view of the world, this has to be considered illusory. LCAs tend to reduce 'impacts assessment' to one number, obscuring (rather than highlighting) uncertainties, and with rarely any attempt to place margins for error around the figures being generated. The scientific uncertainties have not 'disappeared', rather they are less explicitly acknowledged because of the lack of any ranges in the weightings assigned to pollutants in any given impact assessment category. This is all the more strange in LCAs since there is no attempt to pinpoint 'impact' (as opposed to 'potential impact') whereas most CBAs are at least upon some effort to understand actual impacts upon receptors. Neither approach is perfect, but scientific uncertainties surround both.

⁸⁴ Enviro, University of Birmingham, RPA Ltd., Open University and Maggie Thurgood (2004) Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes, Final Report to Defra, March 2004.

⁸⁵ Enviro and EFTEC (2004) Valuation Of The External Costs And Benefits To Health And Environment Of Waste Management Options, Final Report for Defra, December 2004

⁸⁶ HM Customs & Excise (2004) Combining the Government's Two Health and Environment Studies to Calculate Estimates for the External Costs of Landfill and Incineration, December 2004.

⁸⁷ AEAT Environment (2005) Damages per tonne Emission of PM2.5, NH3, SO2, NOx and VOCs from Each EU25 Member State (excluding Cyprus) and Surrounding Seas, Report to DG Environment of the European Commission, March 2005.

⁸⁸ Enviro, University of Birmingham, RPA Ltd., Open University and Maggie Thurgood (2004) Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes, Final Report to Defra, March 2004.

⁸⁹ www.naei.org.uk

⁹⁰ AEAT Environment (2005) Damages per tonne Emission of PM2.5, NH3, SO2, NOx and VOCs from Each EU25 Member State (excluding Cyprus) and Surrounding Seas, Report to DG Environment of the European Commission, March 2005.

⁹¹ See Dijkgraaf, E., and H. Vollebergh (2004) Burn or Bury? A Social Cost Comparison of Final Waste Disposal Methods, *Ecological Economics*, 50, pp.233-247. For additional review and comment, see Dijkgraaf, E. and H. Vollebergh (2005) Literature Review of Social Costs and Benefits of Waste Disposal and Recycling, in *Rethinking the Waste Hierarchy*, EAI: Copenhagen, pp. 80-98 and D. Hogg (2005) Costs and Benefits of Residual Waste Management Options – What Should We Do? Paper presented to the ORBIT / ECN Conference on the Future of Residual Waste Management in Europe: Future Challenges Regarding Climate Change and Sustainable Material Flow Management, 17-18 November, Luxembourg, <http://www.orbit-online.net/orbit2005/vortraege/hogg-doc.pdf>

⁹² The term biogenic effectively means 'originating from biological sources'. Hence, carbon which is not of fossil origin is usually biogenic.

⁹³ Bartelings, H., P. van Beukering, O. Kuik, V. Linderhof, F. Oosterhuis, L. Brander and A. Wagtenonk (2005) Effectiveness of Landfill Taxation, R-05/05, Report Commissioned by Ministerie von VROM, November 24, 2005.

⁹⁴ Bartelings, H., P. van Beukering, O. Kuik, V. Linderhof, F. Oosterhuis, L. Brander and A. Wagtenonk (2005) Effectiveness of Landfill Taxation, R-05/05, Report Commissioned by Ministerie von VROM, November 24, 2005.

⁹⁵ Enviro and EFTEC (2004) Valuation Of The External Costs And Benefits To Health And Environment Of Waste Management Options Final Report for Defra, December 2004.

⁹⁶ Hedonic pricing studies are those which make use of surrogate, or alternative markets to gauge the value of a particular phenomenon. In most hedonic pricing studies concerning waste facilities, the market used is that for housing values.

⁹⁷ Cambridge Econometrics in association with EFTEC and WRc (2003) A Study to Estimate the Disamenity Costs of Landfill in Great Britain, London:Defra, February 2003.

⁹⁸ Kiel, K.A., and McClain, K.T. (1995), House Prices during Siting Decision Stages: The Case of an Incinerator from Rumour through Operation. *Journal of Environmental Economics and Management* 28, 241-255.

⁹⁹ Bartelings, H., P. van Beukering, O. Kuik, V. Linderhof, F. Oosterhuis, L. Brander and A. Wagtenonk (2005) Effectiveness of Landfill Taxation, R-05/05, Report Commissioned by Ministerie von VROM, November 24, 2005.

¹⁰⁰ O. Arnold and S. Terra (2006) Consentement Local a Payer et Localisation d'un Incinérateur, Serie-Etudes 05-E10, Ministère de l'Ecologie et du Développement Durable.

¹⁰¹ A. Rabl et al (1999) Impact Assessment and Authorization Procedure for Installations with Major Environmental Risks, Contract ENV4-CT96-0236, DG XII European Commission, July 1999.

¹⁰² Brisson, Inger, and David Pearce (1995) Benefits Transfer for Disamenity from Waste Disposal, CSERGE Working Paper WM 95-06, London: CSERGE.

¹⁰³ COWI (2000) A Study on the Economic Valuation of Environmental Externalities from Landfill Disposal and Incineration of Waste. Final Report to DG Environment, the European Commission, August 2000.

¹⁰⁴ Eunomia Research & Consulting, Scuola Agraria del Parco di Monza, HDRA Consultants, ZREU and LDK ECO on behalf of ECOTEC Research & Consulting (2002) Economic Analysis of Options for Managing Biodegradable Municipal Waste, Final Report to the European Commission.

¹⁰⁵ Anna Davies (2003) Waste Wars – Public Attitudes and the Politics of Place in Waste Management Strategies, *Irish Geography*, 36 (1), pp.77-92.

¹⁰⁶ See WRAP (2006) Environmental benefits of recycling: An international review of life cycle comparisons for key materials in the UK recycling sector, Banbury: Oxon

¹⁰⁷ See Konrad Schleiss (1999) Grüngutbewirtschaftung im Kanton Zürich aus betriebswirtschaftlicher und ökologischer Sicht: Situationsanalyse, Szenarioanalyse, ökonomische und ökologische Bewertung sowie Synthese mit MAUT, Dissertation ETH No 13,746, 1999; W. Edelmann and K. Schleiss (1999) Ökologischer, energetischer und ökonomischer Vergleich Vergärung, Kompostierung und Verbrennung fester biogener Abfallstoffe, Final report for BFE/BUWAL, BFE, CH-3003 Bern; W. Edelmann and K. Schleiss (2002) Products, Impacts and Economy of Anaerobic Digestion of OFMSW, in J. Mata-Alvarez (ed) (2003) Biomethanization of the Organic Fraction of Municipal Solid Waste, London: IWA Publishing, pp. 265-301; Regine Vogt, Florian Knappe and Andreas Detzel (2001) Environmental Evaluation of Systems for the Recovery of Biogenic Waste, Proceedings from the ORBIT 2001 Conference; F. Knappe, R. Vogt and B. Franke (2004) Biowaste Management from an Ecological Perspective, in P. Lens, B. Hamelers, H. Hoitink and W. Bidlingmaier (2004) (eds.) Resource Recovery and Reuse in Organic Solid Waste Management, London: IWA Publishing, pp. 71-92; D. Hogg et al (2002) Economic Assessment of Options for Dealing with Biodegradable Waste, Report to DG Environment, European Commission, by Eunomia, Scuola Agraria del Parco di Monza, HDRA Consultants, ZREU and LDK; D. Hogg (2003) External Costs and Benefits of Composting and Anaerobic Digestion, in L. Marmo and H. Langenkamp (eds) Biological Treatment of Biodegradable Waste: Technical Aspects, European Commission Joint Research Centre; D. Hogg (2004) Costs and Benefits of Bioprocesses in Waste Management, in P. Lens, B. Hamelers, H. Hoitink and W. Bidlingmaier (eds.) (2004) Resource Recovery and Reuse in Organic Solid Waste Management, pp.95-121; J-O Sundqvist (1999) Life Cycle Assessments of Solid Waste, AFR Report 279, Swedish Environmental Protection Board; O. Eriksson, B. Frostell, A. Bjorklund, G. Assefa, J-O Sundqvist, J. GRanath, M. Carlsson, A. Baky and L. Thyseius (2000) ORWARE – A Simulation Tool for Waste Management, Resources Conservation and Recycling, 36(4), pp.287-307; J-O Sundqvist, A. Baky, M. Carlsson, O. Eriksson and J. Granath (2002) Hur Skall Hushallsavfallet tas Omhand – Utvärdering av Olika Behandlingsmetoder (How Shall Municipal Solid Waste be Disposed – Assessment of Different Treatment Methods) IVL report B 1462, February 2002; J-O Sundqvist (2004) System Analysis of Organic-waste Management Schemes –n Experiences of the ORWARE Model, in P. Lens, B. Hamelers, H. Hoitink and W. Bidlingmaier (eds.) (2004) Resource Recovery and Reuse in Organic Solid Waste Management, pp.45-70

¹⁰⁸ See K. Fricke and H. Santen (2001) Bioremediation of Abandoned Landfills, microbiological Oxidation in Landfill Capping, European Remediation Conference, Crete. K. Hoering, I. Kruempelbeck, H-J. Ehrig, (1999) Long-term emission behaviour of mechanical-biological pre-treated municipal solid waste. In: Proceedings Sardinia 99. Seventh International Waste Management and Landfill Symposium. S Margherita di Pula, Caligari, Italy, 4-8 October 1999. pp 409-418. Recent work in the US has also highlighted the potential of active landfill layers to reduce methane emissions from landfills – see M. A. Barlaz, R. B. Green, J. P. Chanton C. D. Goldsmith and G. R. Hater (2004) Evaluation of Biologically Active Cover for Mitigation of Landfill Gas Emissions, *Environmental Science and Technology*, 2004, Vol.38, pp.4891-4899

¹⁰⁹ National Law Gazette 325/1990 rev. NLG 164/1996.

¹¹⁰ WRc (2004) Estimating Biodegradable Municipal Solid Waste Diversion from Landfill: Monitoring Biodegradable Municipal Waste Removal in a Mechanical Biological Treatment Process, Environment Agency R&D Technical Report P1 - 513 (EP 0173)

¹¹¹ Environment Agency (2005) Guidance on monitoring MBT and other pretreatment processes for the landfill allowances schemes (England and Wales), August 2005.

¹¹² A. Smith, K. Brown, S. Ogilvie, K. Rushton and J. Bates (2001) Waste Management Options and Climate Change, Final Report to the European Commission, DG Environment, July 2001.

¹¹³ DOEHLG (2006) National Biodegradable Waste Strategy. April 2006.

¹¹⁴ DOEHLG (2006) National Biodegradable Waste Strategy. April 2006.

¹¹⁵ DOEHLG (2006) Consultation Paper: Regulation of the Waste Management Sector.

¹¹⁶ The paper from CEWEP contains variations of this theme. The implicit message is that landfill gate fees are likely to be below those which would be required to make incinerators commercially viable, or at least, that the current situation gives too little certainty that incineration will be the cheaper option. See CEWEP (2006) Excess Landfill Capacity: Impacts on the Implementation of Irish Waste Management Policy, CEWEP, Belgium, May 2006.

¹¹⁷ The UK system is slightly different but the sliding scale for assessing 'loss in biodegradability' means that the benefits of stabilisation of waste are not fully captured when the material is landfilled.

¹¹⁸ DOEHLG (2006) Consultation Paper: Regulation of the Waste Management Sector.

¹¹⁹ Indecon International in association with the Institute of Local Government Studies at University of Birmingham (2006) Indecon Review of Local Government Financing, Report Commissioned by the Minister for the Environment, Heritage and Local Government

¹²⁰ John FitzGerald and Edgar Morgenroth (2006) Ex-Ante Evaluation of the Investment Priorities for the National Development Plan 2007-2013, ESRI Report Commissioned by Department of Finance, October 2006.

¹²¹ Davies, Anna (2003) Waste Wars – Public Attitudes and the Politics of Place in Waste Management Strategies, Irish Geography, 36 (1), pp.77-92.

¹²² Davies, Anna (2003) Waste Wars – Public Attitudes and the Politics of Place in Waste Management Strategies, Irish Geography, 36 (1), pp.77-92.

¹²³ CEWEP has expressed some concerns that 'local authorities are not adhering to their own waste plans' (CEWEP (2005) Who are the Protectors of the Regional Waste Management Plans in Ireland? Cewep, July 2005).

¹²⁴ Davies, Anna (2003) Waste Wars – Public Attitudes and the Politics of Place in Waste Management Strategies, Irish Geography, 36 (1), pp.77-92.

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