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Final Report

Strategic Review & Outlook for Waste Management Capacity

Table of Contents

EXECUTIVE SUMMARY II

1. INTRODUCTION 1

1.1 CONTEXT OF THE REPORT 1
1.2 RECENT POLICY INITIATIVES 1
1.3 OUTLINE OF THE REPORT 2

2. REVIEW OF WASTE STRATEGIES 3

2.1. BACKGROUND AND OBJECTIVES OF WASTE STRATEGIES 3
2.2 KEY FEATURES OF THE STRATEGIES IN A REGIONAL CONTEXT 4
2.2.1 The Greater Dublin Region 4
2.2.2 North East Region 6
2.2.3 Cork City & County 6
2.3. CRITICAL APPRAISAL OF THE CURRENT SITUATION IN THE CONTEXT OF EXISTING STRATEGIES 7
2.4. THE FORFÁS ANALYSIS 11

3. WASTE VOLUME PROJECTIONS 14

3.1 INTRODUCTION 14
3.2 ASSUMPTIONS 14
3.2.1 Base Year Data 14
3.2.2 Relationship between Waste Generation & Economic Activity in Future 15
3.2.3 Demographic Influences 16
3.3 PROJECTIONS 16
3.4 MANAGEMENT OPTIONS 17
3.4.1 Introduction 17
3.4.2 Landfill 17
3.4.3 Recycling 18
3.4.4 Thermal 19
3.4.5 Landfill Disposal Capacity 19

4. IRELAND'S STRATEGY FOR RECYCLING 26

4.1 IDENTIFYING APPROPRIATE TARGETS 26
TABLE 4.1: HOUSEHOLD WASTE RECYCLING RATES IN 27
4.2 ACHIEVING THE TARGETS 27
4.3 IMPLICATIONS FOR WASTE DISPOSAL CAPACITY AND RESIDUAL LANDFILL 28

5. PLANNING AND WASTE MANAGEMENT 32

5.1 EXISTING PLANNING APPROACHES 32
5.1.1 The UK 32
5.1.3 Ireland 33
5.2 POSSIBLE DEVELOPMENT OF LEGISLATIVE DEVICES 34

6. CONCLUSIONS & RECOMMENDATIONS 35

APPENDIX 1: LIST OF CONSULTATIONS 40
APPENDIX 2: DETAILED TABLES FOR PROJECTIONS 41
ASSUMPTIONS UNDERLYING THE PROJECTIONS 41

Executive Summary

1. Issues related to the management of waste have come to the fore in Ireland in recent years. Three main reasons can be identified for this. First, waste has grown rapidly in the past 5 years because of the economic boom and changing incomes and lifestyles. Second, increased environmental concerns and international integration have caused both the public and private sectors in Ireland to look more closely at the way in which issues such as waste management are handled. Finally, and arising from these two developments, there is considerable pressure, in part arising from EU requirements, for change in the way waste is handled.

2. The analysis in this report is being undertaken against the background of recent government policy initiatives for the handling of waste and strategies that have been put in place to implement this policy. Policy is contained in a number of statements and *Regional Waste Management Strategies* provide the means for the implementation of this policy. These strategies provide a starting point for the analysis. Although there are differences of approach between them, their formulation represents a significant move forward towards waste management planning on a more rational area basis rather than planning within arbitrary county boundaries. However, this approach has not been followed to the extent required in the Greater Dublin area, where surrounding counties should be included in planning for waste management in the capital. Because of this shortcoming, there is major uncertainty regarding how and where waste produced in Dublin City & County will be disposed.

3. The strategies contain a broad approach to dealing with the problem, emphasising reduction, recovery and recycling as well as disposal. In general, however, the assumptions regarding both growth of waste and of non-disposal options appear excessively optimistic. The issues as regards the growth of waste are manifest in a number of respects, including, for example:

- Assumptions regarding the growth of the Irish economy and its impact on commercial and industrial (C&I) waste;
- The underlying growth trend in household waste; and
- The capacity of landfill sites currently licensed.

4. Even allowing the assumptions contained in the strategies, a summary of the comparison of landfill disposal capacity with the projections for waste produced shows a capacity shortfall of over 940,000 tonnes in 2002. This will rise to over 1 million tonnes by 2003 and level off close to this up to 2010 when it starts to rise again. In the short term, this shortfall is equal to close to 40 per cent of the waste that remains after recycling. Furthermore, from 2003, the available capacity, including thermal and landfill, will be inadequate to deal with the amount of household waste after recycling. In these years, there is a real fear that there will be no access to landfill for C&I waste, given available capacity.

5. There are some differences in the projected outcomes between the regions with the Greater Dublin region expected to have sufficient capacity for household waste in all years, although there will be a growing deficit in relation to C&I waste. However, there are three main general conclusions:

- First, all regions experience substantial shortfalls in capacity of up to 100 per cent of the volume of C&I waste.
- Second, while these shortfalls are being experienced in most regions at present, they are about to get worse over the short to medium term in all areas.
- Finally, the growth in the shortfall will ease after 2005 and the situation will improve somewhat in some regions only with the assumed availability of thermal treatment

and growth in recycling. No region returns to a situation of adequate capacity, although the situation in the North East region improves considerably.

6. Therefore, even with the full availability of the thermal capacity that is proposed, and if recycling targets in terms of the overall percentage are met there remains a critical deficit of capacity to handle the waste that requires disposal. This will impact primarily on C&I waste. This crisis is imminent and already has begun to impact. For example, one result of the lack of capacity has been the growth of illegal dumping in recent years.

7. As regards the targets for recycling contained in the strategies, a few important lessons emerge from this discussion, for example:

- Ireland's recycling targets are ambitious by EU standards;
- There are considerable financial and non-financial costs associated with recycling;
- These costs are greatest during the transition phase i.e. in the short to medium term in Ireland;
- A carefully designed incentive structure is required to achieve the targets;
- The targets that are set will mean much greater increase in the volume of materials recovered than was originally thought;
- How to use the recovered material is an important issue and will be particularly difficult to handle in Ireland.

8. Taken together, these points mean that achieving the recycling targets will be very difficult, particularly over the time period envisaged. Any shortfall in this respect will be seen in an increased demand for disposal facilities. There are significant uncertainties relating to the assumptions regarding thermal treatment.

9. The consultants have prepared what they consider to be a 'most likely outcome' scenario, with more reasonable, although very demanding, assumptions in relation to gross waste projections, recycling and treatment. Under the most likely outcome, even if Ireland increases its recycling to 1 million tonnes per annum, thereby exceeding the EU average by a considerable margin, and puts in place all the proposed thermal facilities, the residual landfill capacity required will be close to what is required this year. This quantity significantly exceeds the total available licensed landfill currently available. If the thermal treatment does not come on stream as planned then the requirement for landfill will be even greater. This is the key finding from this analysis. Under realistic assumptions regarding the growth of gross waste arisings and with ambitious but feasible recycling and recovery targets, a realistic objective is that the residual landfill requirement will stay close to the level of recent years. The only attainable alternative is that the landfill requirement will continue to rise in excess of population and GDP growth as has been the case in recent years.

10. Drawing these strands together the main conclusions reached are that:

- The waste arisings projected in the strategies are too low and have already been superseded. On the basis of the assumptions used in this report, it is estimated that waste arisings in the five regions covered amount to over 2.9 million tonnes in 2002, an increase of 28.8% on the 1998 period. The strategies projected that the total growth in waste up to 2013 would be only 23% above the 1998 figure.
- Because there is no spare capacity allowed for in the strategies, there is a considerable deficit in terms of facilities to handle the waste that will arise over the next few years. This figure will exceed 1 million tonnes a year by 2003 even if recycling as envisaged in the strategies is achieved. This is equal approximately to the total amount of household waste produced in a year.

- The ambitious recycling targets will be difficult to achieve without appropriate incentives and management strategies thereby adding to the waste that must be handled otherwise. The strategies provide for recycling in the region of 45% of total waste. This is about three times the average rate of recycling in EU countries. If achieved it would also mean that Ireland would have to find a use for approximately 1.7 million tonnes of recycled material each year. This is almost eight times the volume that was recycled in 1998, the last year for which figures are available. If a market for recycled material is not developed as required then this material will become waste again.
- If Ireland achieves a target of 25% recycling of Household and C&I waste – well in excess of the EU average of 14% in recent years – and puts in place all the thermal facilities proposed, then the most likely outcome is that residual landfill requirement in 2012 will be approximately equal to the requirement in 2002.
- There is little likelihood of sufficient landfill capacity becoming available to accommodate this waste given the problems that are currently being experienced. As a result, Ireland is facing a crisis in the next few years in regard to waste disposal facilities.

11. It is recognised universally that the waste management industry must improve its image and raise standards. However, there is a concern that some operators within the industry are able to continue to work outside the requirements of the regulatory framework. This is giving rise to increasing frustration amongst waste management operators who have chosen to work within the legal framework that little if anything has happened to deter the serial culprits. There is little doubt that the economic benefits of operating illegally still outweigh the risks of being caught so that legitimate players are at a distinct competitive disadvantage. If this is allowed to continue it could deter any further major investment by the private sector.

12. To achieve effective enforcement of regulations, it is necessary to address resource constraints in the EPA and in Local Authorities.

13. The roles of Local Authorities in waste management require clarification and rationalisation. The Local Authorities have a role in the facilitation and enforcement of waste management plans. However, there is no clarity as to what, if any, are the obligations of Local Authorities in relation to commercial and industrial waste. In addition, many local authorities are engaged directly in service provision, in relation to municipal waste. This situation can give rise to inefficiencies and conflicts in relation to the proper regulation and provision of adequate facilities for the management of commercial and industrial waste.

14. The following recommendations have been formulated to address these conclusions and thereby to facilitate the achievement of the targets that have been set:

(i) In relation to illegal dumping, it is recommended that the role of the regulatory and enforcement bodies and their working relationship with the industry be reviewed. The objective should be to devise a working system that encourages and rewards operators to work within the legal framework and has effective punishment for failing to comply, thus boosting confidence, incentives and investment opportunities.

(ii) There is a need to establish an authority which is responsible for procuring adequate waste disposal and management facilities and for their effective regulation. This applies particularly to commercial and industrial waste, in respect of which the consultants have been unable to establish any clear responsibility in this matter. The Polluter Pays Principle (PPP) is widely recognised as the best means to achieve allocative efficiency. However, in the absence of adequate regulatory oversight, clarity of responsibility in

relation to facilities provision and effective enforcement procedures for non-compliance, there is not a transparent means for translating this principle into practice. This issue should be addressed in the short term.

(iii) Projections indicate that planned landfill capacity per annum over the period to 2012 will need to be approximately equal to the 2002 requirement. This level of provision would provide incentives to encourage recycling and recovery while ensuring adequate disposal capacity.

(iv) In the current crisis relating to waste disposal capacity, especially in relation to commercial & industrial waste, the Minister for the Environment & Local Government should issue a Policy Directive under Section 29 of the Planning & Development Act 2000 to Local Authorities. This should require them to ensure that adequate landfill capacity is available to deal, in the short term, with the deficit in supply of commercial and industrial waste disposal capacity currently and in prospect over the next three to five years. The site selection process should, of course, be in line with relevant EU directives and EPA guidelines and any criteria contained in development plans. It is considered incorrect to assume that this would provide a disincentive to recycling in the future, since appropriate fiscal and pricing measures can be put in place irrespective of the availability of excess landfill capacity.

(v) A review of waste management strategies needs to be undertaken in the short term, focussing on the assumptions that underlie them and the conclusions reached, particularly in relation to the volumes of waste that are projected. In addition, any review should contain:

- A re-examination of recycling targets to identify how recovered materials will be used. There has been too much emphasis to date on separation of waste with little attention paid to what will be done with the recovered material and how the operation of the process will be funded in the longer term. This is a key issue to be addressed by the National Waste Management Board.
- An assessment of the scope to re-use construction and demolition waste. This will be a major constraint on recycling this type of waste, irrespective of the charges that are applied for landfill. An incentive structure needs to be specified and a statement of standards to overcome concerns in relation to the appropriate and safe use of the material are required to achieve higher re-use.

(vi) Revised waste management strategies, should be prepared which should incorporate the findings from the review and incorporate some contingency planning to recognise the facts that:

- Delays are likely in putting thermal treatment infrastructure in place;
- Recycling targets are optimistic and might not be achieved within the lifetime of the strategies;
- Some assessment of sensitivity to strategy target compliance needs to be built in; and
- Waste projections are subject to error requiring that some spare waste management capacity must always be available.

(vii) Revised strategies should contain explicit recommendations as to what provision should be made to deal with the consequences of these events.

(viii) There needs to be much greater integration of waste management into local, regional and national development plans. To help achieve this in the short term it is recommended that the Minister for the Environment & Local Government should issue Policy

Guidelines to Local Authorities in relation to how Development Plans should deal with waste and incorporate relevant policies from regional waste strategies. This should include guidance on pre-designation of waste management centres and other similar infrastructure. In addition, guidance should be offered in relation to how applications for the development of waste management infrastructure that is identified in development plans should be sequenced. This would increase confidence of potential developers of waste disposal and treatment facilities to purchase sites and bring forward development plans

(ix) A single *Waste Management Agency* should be established with executive powers to plan, consult, co-ordinate and communicate waste strategy. It should be charged with preparing a national waste management strategy and with ensuring that regional strategies are consistent with this. It should also be responsible for ensuring that plans and strategies are implemented in a rational manner.

(x) To overcome weaknesses in the audit trail in Ireland when compared, for example, with the UK, a fully audited waste tracking system, with an emphasis on duty of care, should be introduced in Ireland.

(xi) The current incentive structure for achieving targets contained in regional waste strategies is inadequate and needs to be strengthened. To this end it is recommended that:

- An examination should be made into the feasibility of formalising and co-ordinating a system of dis-amenity payments. These have begun to emerge on an *ad hoc* basis.

- An appropriate incentive structure should be put in place in relation to household waste. In particular, this should include the replacement of flat waste management charges with per unit or per volume charges. A failure to do this greatly weakens the dis-incentive implied by charges since the charge applies irrespective (within limits) of the volume of waste that is produced.

- The incentive structure, particularly as it applies to landfill charges, should be reformed to ensure that it is appropriate to achieve stated objectives rather that reflecting the supply and demand conditions that pertain. Increased costs for landfill will not lead to increased recycling if the targets are too high but will lead to an increase in illegal dumping.

(xii) While some initiatives have been brought forward in relation to the funding of capital expenditure for recycling infrastructure, there have been no initiatives to identify where the funds for these operation of these facilities will come from. Currently, it appears that many local authorities will rely on landfill charges. However, this is unsustainable since this source of funds will decline as landfills close. Recycling is expensive and an alternative source of funds to pay for recycling needs to be identified.

1. Introduction

1.1 Context of the Report

Issues related to the management of waste have come to the fore in Ireland in recent years. Three main reasons can be identified for this. First, waste has grown rapidly in the last five years because of the economic boom and changing incomes and lifestyles. With the Irish economy now more than twice the size it was less than a decade ago it is not unexpected that this should be so. However, the extent of the increase in waste volumes was not foreseen, has not been accommodated in the strategies that have been formulated, and may not yet have been fully comprehended.

Second, increased environmental concerns and international integration have caused both the public and private sectors in Ireland to look more closely at the way in which issues such as waste management are handled. This has led to a major re-thinking of the issue and the formulation of strategies to deal with the problem. However, as is made clear below, the thinking in this area is incomplete and there are some important weaknesses in terms of the strategies to deal with waste that have emerged.

Finally, and arising from these two developments, there is considerable pressure for change in the way waste is handled, partly arising from EU directives. However, this has been manifest to date in a negative manner that emphasis opposition to proposed solutions without identifying workable alternatives. This development means that the debate has increasingly become one that emphasises local interests rather than focusing on the need to handle a national issue on a national basis. Furthermore, recognition that there is a better way of handling the issue than has been adopted heretofore has led to the belief that there is a costless way of handling waste. In fact, as demonstrated below there is no costless solution and finding a successful solution to the problem means adopting a new allocation of costs. It is not surprising that this invites opposition if these costs are not spread evenly, with the danger either that a stalemate will emerge or that unsustainable solutions are proposed.

The present report has been prepared by *Peter Bacon & Associates, Economic Consultants* on behalf of *Celtic Waste Limited*. The consultants wish to acknowledge with gratitude assistance provided by a wide range of people and organisations in the course of the consultation process undertaken as part of this project. However, the analysis, views, conclusions and recommendations contained here are the sole responsibility of the consultants.

1.2 Recent Policy Initiatives

The analysis in this report is being undertaken against the background of recent government policy initiatives for the handling of waste and strategies that have been put in place to implement this policy. Policy is contained in a number of statements and *Regional Waste Management Strategies* provide the means for the

implementation of this policy.[1] These strategies provide a starting point for the analysis. The recommendations that are formulated at the end of the report are designed to help achieve the objectives that are contained in the policy statements and in the strategies. This means that the relative financial costs of the different ways of handling waste are not discussed in terms of the impact on the competitiveness of industry in Ireland nor on disposable incomes in households. Instead, it is accepted that the targets are appropriate in the sense that achieving these targets would improve the standard of living in Ireland. In other words, the analysis does not adopt or argue for a different set of targets. However, it is considered that the time period over which these targets can be achieved is certainly open to question. Rather, it concentrates on identifying the measures that are required to ensure that policy can be implemented while providing adequate waste management facilities in the difficult interim period, as Ireland changes from one system to a quite different approach.

1.3 Outline of the Report

There are three main elements to the analysis contained in this report:

- A review of relevant literature and policy, including relevant planning practices
- A range of consultations with personnel involved in waste management planning. A full list is contained in Appendix 1.
- Estimation of future waste arisings on the basis of an appropriate model that is fully detailed in the text.

The strategies are discussed in the next section and a number of concerns are raised in relation to the ability of the Local Authorities to achieve the targets that are set. Among the most important of these concerns are issues relating to the volume of waste arisings aver the period covered by the strategies – 1998 to 2012 in most cases.

Section 3 shows the impact on the overall volume of variations in the underlying assumptions and arguments are put forward that the projections in the strategies do not provide a reliable basis for planning. One of the most important elements of policy is to radically change the volume and importance of recycling in Ireland. However, this raises a number of issues that are discussed in Section 4. These demonstrate the ambitious nature of the targets that have been set.

The final two sections discuss options for handling problems that are foreseen in the interim period of implementing policy. Some opportunities exist for new disposal facilities and these are explored in Section 5. Ultimately, however, a much more comprehensive bundle of policy initiatives will be required if the overall strategy is to be successful. The final section of the report provides a summary of the main conclusions and recommendations that emerge from the analysis.

[1] Two key statements of policy are:
Waste Management: Changing Our Ways (September 1998) and *Delivering Change: Preventing and Recycling Waste* (March 2002).
Regional Waste Strategies have been published – some in draft form – to cover Cork, Dublin, Midlands, North East, South East, Connaught and the Mid West. Counties Donegal, Kildare and Wicklow have adopted separate strategies.

2. Review of Waste Strategies

2.1. Background and Objectives of Waste Strategies

The 1996 Waste Management Act charges the Minister for the Environment with responsibility for waste management, and requires local authorities to prepare waste management strategies for non-hazardous waste. Detailed requirements in relation to the preparation and content of local authority waste management strategies were set out in the Waste Management (Planning) Regulations, 1997.

The policy document *Changing our Ways*, published in October 1998 reinforced the approach, and set a number of targets to bring about a dramatic reduction in reliance on landfill. It also encouraged participation by the private sector in the provision of waste management services, and sought greater use of 'the polluter pays' principle and of legislative instruments extending the scope of producer responsibility initiatives. As a result of delays, the Waste Management (Amendment) Act, 2001 aimed at providing a legal mechanism through which the waste management planning process could be brought to conclusion. This provided for the transfer of responsibility for adopting strategies from the elected members of a local authority to its County Manager. It also required that waste management infrastructure be deemed to be part of the County Development Plans. This provided an impetus for local authorities to adopt plans.

By mid September 2001, every local authority in the country had adopted a plan for managing non-hazardous waste, while the EPA published a national plan for the management of hazardous waste in July 2001. The local authorities were encouraged to adopt a regional approach to this planning process, with a view to more efficient provision of services and infrastructure. Apart from Wicklow, Kildare and Donegal County Councils, which decided to proceed with county plans, all local authorities in the country are now involved in regional waste management strategies.

In total, six regional waste management strategies, involving 25 local authorities, have been adopted. In addition, six counties in the southeast have adopted strategies, and it is proposed that these will form a regional plan as shown in Table 2.1. The waste volumes shown in this table are the same as those contained in the strategies.

The waste management strategies to be prepared by the local authorities were required to 'address all aspects of the prevention, minimisation, collection, recovery and disposal of non-hazardous waste, within the local authority area'. These strategies are to be reviewed on a five-year basis.

However, in some areas, local authorities have not supported strategies they perceived as being unpopular within their localities. This has led to delays in strategies being adopted. This opting out of the regional planning approach effectively means that the other authorities involved are obstructed from making progress.

Table 2.1: Regional Waste Management Areas

Region	Local Authorities	Annual Waste (1998 tonnes)
Dublin	Dublin Corporation, Fingal, South Dublin and Dún Laoghaire	2,300,000
Cork	Cork County Council and Cork Corporation.	332,000
Connaught	Galway Corporation, Galway County Council, Sligo, Mayo, Leitrim and Roscommon	332,000
Northeast	Louth, Meath, Cavan and Monaghan	520,000
Southeast	Waterford Corporation, Waterford County Council, Kilkenny, Carlow, Tipperary SR and Wexford	350,000
Midlands	Westmeath, Offaly, Laois, Tipperary NR and Longford	152,000
Midwest	Limerick Corporation, Limerick, Clare and Kerry County Councils	225,000

2.2 Key Features of the Strategies in a Regional Context

There is wide variation geographically in Ireland, both in the production of waste and in the availability of disposal facilities. If a Greater Dublin Area is defined along the lines of many recent government plans to include the Dublin City & County, plus counties Kildare, Wicklow & Meath, it accounts for approximately two-thirds of the total waste that is produced in Ireland. The Dublin Regional Waste Strategy covers Dublin City & County only, but still accounts for over half of Ireland's total waste production. As a result of this uneven distribution, it is appropriate that attention in addressing the issue should be concentrated more on some areas than on others. These areas are the Dublin Region (plus Kildare and Wicklow), the North East Region and Cork City & County. The strategies relating to these areas are considered in some detail in the following sections. The projections in Section 3 also cover these areas, along with projections for Galway and Limerick.

2.2.1 The Greater Dublin Region

The Dublin Regional Strategy covers Dublin City and County.[2] Approximately 33 per cent of the country's population lives in this area and, based on CSO projections, its population will continue to experience rapid growth over the next two decades. The strategy estimated that there were 383,000 tonnes of household waste, 308,000 tonnes of commercial waste and 408,000 tonnes of industrial waste arising in the Dublin region in 1998[3].

[2] Separate waste management strategies have been prepared for counties Kildare and Wicklow while Meath is included under the North East Regional Strategy.

[3] The definitions of commercial and industrial (C&I) waste used here are as in the strategies. However, in the projections in Section 3, the definitions exclude sludges and mine-tailings that do not enter the normal disposal systems.

The most obvious issue identified in the strategy is the severe shortage of landfill in the short to medium term. The closures of Friarstown and Dunsink and restrictions at Balleally and Ballyogan mean that the problem of disposal is likely to intensify and the plan estimates that total capacity in the region would be exhausted in 2.5 years. Baling facilities are planned to allow the use of Arthurstown thereby providing some relief. However, it is accepted that the region is likely to continue to rely on access to landfill in surrounding counties in the short to medium term. However, it is unclear if this view is built into the strategies for these counties as discussed below. As a result, the plan concludes that there is an urgent need for the provision of general disposal capacity in the region but this issue is not addressed in specific terms. However, the diversion of some of the very large volume of construction waste from Balleally would provide some capacity for other waste streams in the short to medium term.

In the past year the total amount of waste entering Balleally has been reduced by almost 50 per cent – since C&D waste is now accepted for cover only. While the amount entering the land fill could rise in the future if an extension to the licence is granted, a more managed approach to the use of the site will be adopted. The extension that has been applied for would provide additional capacity at Balleally for 1 million tonnes giving a lifespan of about 4 years, at current rates of usage, from 2002. A new landfill is also proposed for the Fingal area but a site has not yet been chosen.

The plan sets out a number of scenarios for dealing with the problem of shortage of disposal facilities and advocates a high reliance on environmentally friendly options such as recycling and thermal treatment. However, these are medium term solutions. The plan accepts that serious problems of shortage of disposal facilities are likely to arise in the short term. Indeed, these have become manifest in the period since the work for the plan was undertaken in 1997.

The Dublin plan contains significant deficiencies, namely:

- Even within the context of the plan, it is recognised that significant disposal difficulties are likely to arise in the short to medium term. In fact, these are worse than anticipated.
- The projections for growth in waste contained in the plan underestimate recent growth significantly and also appear likely to underestimate future growth rates.
- The short-term plans for recycling are overly optimistic while the feasibility of longer-term plans is uncertain. In addition, there is no fall-back position proposed to deal with these eventualities, if they arise.
- There is a high reliance on the assumption that there will be timely provision of thermal treatment. Again, there is no margin for error built in.
- The plan recognises likely deficiencies in terms of the quantity of landfill that will be required but does not offer any feasible solutions.

Individual strategies have been produced for Counties Kildare and Wicklow. The projections for future growth are similar in percentage terms to those used in the Dublin region and similarly are considered to be at the lower end of the likely outcomes. The overall target is to reduce the level of waste growth from 3 per cent per annum to zero in the short to medium term. Given the population growth that is projected for these counties, this is overly ambitious. Targets for recycling and

recovery are in line with government recommendations at 89 per cent in total. While these were produced in terms of the counties' own waste management it is recognised that co-operation with surrounding counties will be required, if there is to be any hope of reaching them.

2.2.2 North East Region

Given the situation in Dublin City & County, it is clear that strategies in the North East region, which includes County Meath although it is normally thought of as forming part of the Greater Dublin Region, will be highly relevant. The waste management plan for the North East region identifies annual waste arisings of 516,000 tonnes in the area, including 194,000 tonnes from construction and demolition, and mining and quarrying. At the time the plan was drafted there were nine landfill sites in the region, a number of which were recognised as being of minor importance in the short term only. Indeed, the large facility owned by Drogheda Corporation at Mell has since closed. So has Basketstown, Meath County Council's municipal solid waste landfill facility. The result is that all solid waste produced in County Meath is disposed of outside its border.

The proposed strategy provides for the handling of a total of approximately 435,000 tonnes in 2014, the projected gross waste arising in that year. Given that the population of the region is expected to increase in this period, this implies onerous assumptions regarding waste avoidance. Much of this is assumed to be achieved with regard to construction and demolition waste, but the projections for household and C&I imply slower growth in gross waste than has been seen in recent years.

The strategy allows for recycling of 43 per cent, thermal treatment of 39 per cent and landfill totalling 18 per cent of the gross (88,000 tonnes). The plan recognises that new landfills will be required over the period and it is assumed that there will be development of sites with medium to long term capacity in each county.

In summary, if gross waste arising can be reduced as outlined and the necessary recycling and recovery parts of the plan are implemented, the region should be able to handle the waste that arises. As a result, there may be some opportunities for co-operation with Dublin to ease the problems that will be experienced there but this is not included in the plan.

2.2.3 Cork City & County

Although separated plans were originally drafted, Cork City and County eventually adopted a joint regional approach to waste management strategy. As with other regions, the strategy emphasises the need to move away from reliance on landfill and sets out 70 actions to be undertaken to achieve this. The plan places a high emphasis on minimisation and recycling and sets targets for recycling according to the type of

waste and its origin. In addition, thermal treatment is proposed[4]. The plan recognises that:

- Even if thermal and recycling targets are met, there will be a need for residual landfill and recommends that a site should be identified. It is proposed that the facility at Bottlehill would meet this requirement.
- There will still be need for direct landfill and concludes that unless new facilities are identified, all landfill capacity would be exhausted by 2002. The plan identifies 6 sites suitable for new licences or for existing licences to be extended. In addition, a recovery facility for C&D waste is proposed at Kinsale Road. This has progressed considerably since the original strategy was formulated.

Many of the criticisms above apply equally to the Cork strategy. In addition, the base year data on which the original strategies were based have now been updated and these new figures are used in the projections in Section 3. Furthermore, the recycling targets would result in considerable quantities of recycled materials to be handled but this is not addressed in the strategies. The importance of this point is returned to in Section 4 below.

A key part of the strategy is the provision of a residual landfill facility at Bottlehill – for the disposal of waste after treatment – but planning for this facility is behind schedule and is currently under appeal. There are currently strict quotas operating at all Local Authority landfill sites to restrict the entry of C&I waste. Even so, it is currently estimated that there is sufficient capacity for one year only and it is not known what facilities will be used for household waste after this period.

2.3. Critical Appraisal of the Current Situation in the Context of Existing Strategies

Although there are differences of approach between the various regional strategies, their formulation represents a significant move forward towards waste management planning on a rational basis rather than planning within arbitrary county boundaries. However, this approach has not been followed to the extent required in the Greater Dublin region, where surrounding counties should be included in planning for waste management in the capital. As a result of this shortcoming there is major uncertainty regarding how and where waste produced in Dublin City & County will be disposed.

The strategies contain a broad approach to dealing with the problem, emphasising reduction, recovery and recycling as well as disposal. In general, however, the assumptions regarding both the growth in waste and of non-disposal options appear excessively optimistic.

The issues as regards the growth of waste are manifest in three respects:

- Assumptions regarding the growth of the Irish economy and its impact on commercial and industrial waste

[4] The Cork waste management plan does not adopt the concept of incineration. However, the regional waste management plan is based on the acceptance of national policy for the treatment of waste, of which thermal treatment is one element.

- The underlying growth trend in household waste
- The capacity of currently licensed landfill sites.

These issues are discussed in some detail below.

Statistics from the EPA's National Waste Database highlight the strong link between economic growth and increasing levels of waste generation. During the period of 1995 to 1998, when GDP growth was close to 9.2 per cent per annum, the quantity of reported manufacturing waste in Ireland grew by 38 per cent. Over the same period, the quantity of municipal waste grew by 11 per cent, the level of construction waste generated increased by almost 100 per cent. This relationship between GDP and waste generation may not be typical of the long term trend – and it would be unsustainable in the longer term – but it has served to undermine the assumptions in the strategies regarding the growth of waste resulting from economic growth. In general, these assume the GDP growth in the late 1990s and into the foreseeable future would be in the region of 3 to 5 per cent per annum. A number of the strategies base their projection on forecasts produced by the ESRI but some ignore the fact that economic growth in Ireland in the 1990s outpaced all expectations. Furthermore, the strategies either translate these growth rates directly into waste growth or more commonly they assume that future waste arisings will be increasingly decoupled from economic growth such that 5 per cent growth in output will imply a static output of commercial and industrial waste. This is unrealistic.

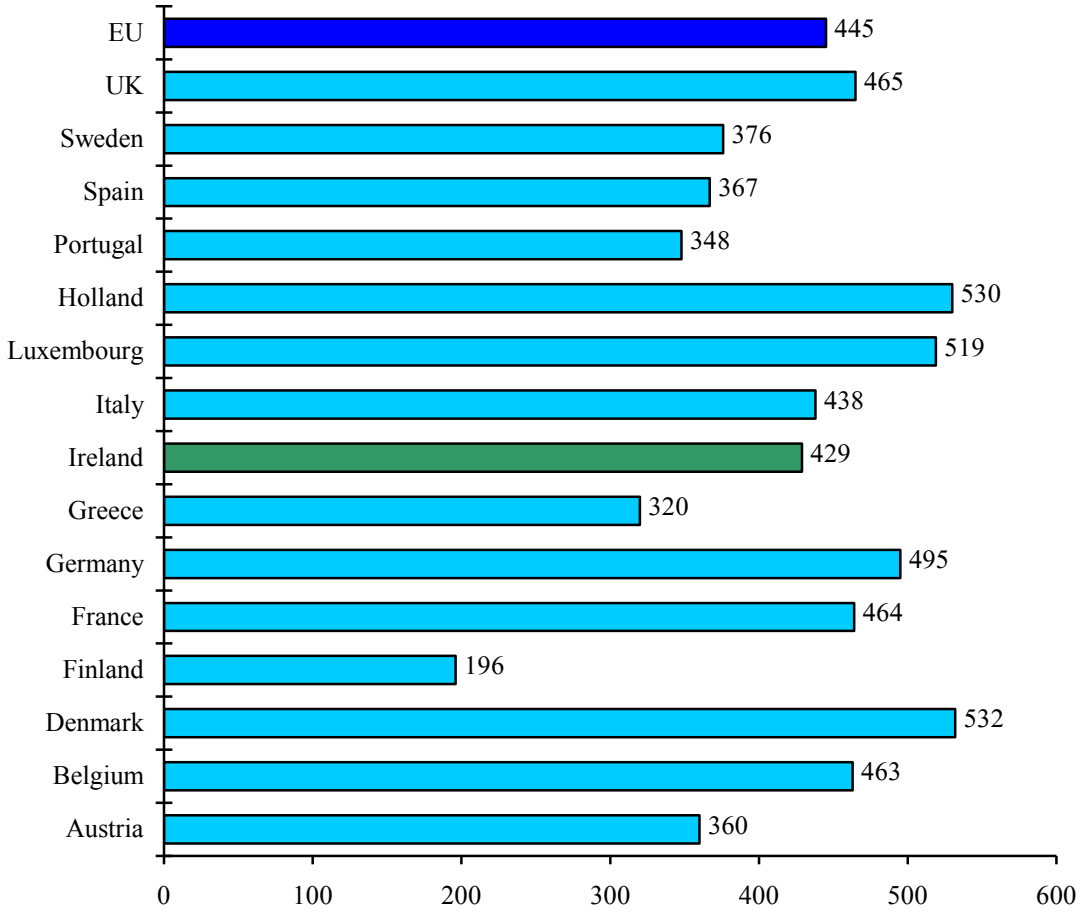
Regarding household waste, most of the strategies are based on historic waste production and factor in population growth projections for the future. However, they assume that the link between population growth and waste growth will weaken and a static situation will emerge within a few years. In addition to using population projections from the early 1990s that are now clearly inappropriate, the use of household data from the 1980s is questionable. Household waste arisings will clearly be dependent on population changes but income levels are also important variables. As a result, static population growth is not a predictor of static growth in household waste. It is worth noting, as shown in Figure 2.1, that household waste arisings per capita in Ireland are not particularly high and are well below other developed countries. For countries with similar income levels, only Austria, Sweden and Finland produce less household waste per person. As a result, waste prevention on the extent that is assumed in the strategies is very ambitious and does not seem to be based on experience in comparable countries.

Irish income levels have risen rapidly in recent years and domestic demand as a result of consumption has been a key variable underlying the rate of economic growth in recent years. This is not only important in terms of the absolute level of household waste currently but is also important in meaning that the gross rate of growth, i.e. before the impact of increased recycling, will exceed the rate of population growth over the medium term future. However, this factor is not addressed adequately in the strategies.

The Polluter Pays Principle (PPP) is widely alluded to in the strategies and is recognised as the best means to achieve allocative efficiency. The analysis in this report assumes that PPP applies. However, it is recognised that in the absence of adequate regulatory oversight, clarity of responsibility in relation to facilities

provision and effective enforcement procedures for non-compliance there is not a transparent means for translating this principle into practice. This issue needs to be addressed in the short term.

Figure 2.1: Household Waste Arisings (kg/person/year)



Source: Department of the Environment and Local Government

These issues have a number of important implications for the validity of the conclusions that are reached in strategies.

- Firstly, on the basis of the growth in waste recently seen it is clear that a decoupling of economic growth from waste growth, even if it is achieved relative to recent experience, is highly unlikely to produce a static waste growth outcome. At the very best, it is more likely that a corresponding growth rate could be achieved. As a result, the projections in the strategies regarding future waste generation from this source are overly optimistic. The causal relationship that is proposed by Forfás (see section 2.4 below) is more realistic: that the failure to deal with C&I waste will result in lower economic growth and a constraint on the country's ability to realise fully its potential economic growth. This would probably reduce waste output, but it is not a policy prescription that should be advocated in any rational planning process.

- Secondly, the huge growth in waste in recent years, means that there is currently much less spare capacity in landfills than is assumed in the strategies

and indeed a number that were to provide facilities in the future are now closed. Carrowbrowne (Galway Corporation) and Mell (Drogheda) provide examples of this problem.

- Finally, the unforeseen growth in recent years means that, irrespective of future growth rates, waste production in Ireland is now standing at a much higher absolute volume than was foreseen in the strategies' projections. As a result, the fact is that many of the underlying assumptions and resulting conclusions of the strategies are now out of date and the strategy must address the problem as it currently stands rather than what was foreseen some years ago.

The implications of these remarks are dealt with further in Section 3 which provides updated projections for the volumes of waste that must be handled and the capacity that is available.

The assumptions relating to non disposal options – principally recycling – that are contained in the strategies are also ambitious and imply that Ireland will move into line with the European countries with the highest rates of recycling within a limited time-frame. The shortcoming is that consideration is not given to the measures needed to make these assumptions happen in practice. There is little recognition of differences that exist in the incentive structure that surrounds decisions regarding the preferred method of handling the waste. Furthermore, the strategies do not take adequate recognition of the costs that are associated with change – including realised costs, risk, the dangers of non-compliance in an uncertain environment (free rider problems) and general resistance to change. Instead the strategies adopt an approach that emphasises the differences between two static situations. In other words, they compare the waste management process in Ireland currently with the situation in selected other countries. The UK is excluded specifically from comparison as it is closest to the current situation in Ireland. The strategies assume that in the future, the process of waste management in Ireland will have similar characteristics to other countries that already have higher rates of recycling and thermal capacity.

This comparative static approach ignores how the difficult transition between the current situation and the outcome that is assumed in the future is to be achieved.

Furthermore, the strategies do not deal with the implications of a situation in which the assumptions are not realised. No sensitivity analysis is made and no margins of error are catered for. These represent fundamental shortcomings, the net effect of which is to underestimate the emerging magnitude of the waste management issue and the consequences of inadequate treatment and disposal facilities. Consequently, the strategies remain largely aspirational. It is not clear how they will be implemented. For as long as it is not recognised that waste management implies costs, no matter how it is handled, then implementation will be a major problem. The strategies represent a particular distribution of the costs associated with waste management, not the elimination of these costs. In a situation such as this, progress requires not only rational planning but also a means to redistribute these costs. This is lacking in the strategies. The most obvious result of this weakness is local opposition to the development of waste handling facilities, even where these facilities are clearly integral to the overall plan and likely to provide net benefits to the wider community.

This problem is currently manifest in the planning process and while there are reforms that would assist, if implemented, merely reforming the planning system does not address this underlying weakness. Furthermore, the strategies do not identify how the high operational costs of recycling are to be funded.

2.4. The Forfás Analysis

The Forfás report[5] starts from the position that, with the rate of waste generation continuing to increase and existing waste disposal sites reaching the end of their useful lifetime, a feasible strategy for the management of waste within Ireland is now a matter of urgency. The report states that if this issue is not addressed, industry will be forced either to scale-down its operations or be deterred from establishing in Ireland. What is more, progress in the development of critical new waste management infrastructure currently is being impeded both by the lack of public consensus on the way forward and by the absence of national and regional focus in the coordinated and consistent implementation of existing strategies.

This conclusion is given further credence by the conclusions of a survey of company executives[6]. In this 61 per cent replied that they were concerned or very concerned about emerging shortages in the availability of disposal facilities and 92 per cent said that they believed this to be an issue of increasing concern for industry in Ireland. Respondents were almost unanimous in stating that this issue was affecting Ireland's competitiveness with 79 per cent believing that further industrial growth will be limited due to the problem. Some 80 per cent of executives were willing to describe the shortage of waste disposal facilities as a crisis for Ireland.

The Forfás report is concerned primarily with analyzing the way in which existing strategies can be implemented in an effective manner rather than providing an analysis of the fundamental issues. An important requirement is seen to be the need to overcome the considerable delays and uncertainties that are involved in the current planning process and which Forfás believes are likely to deter private investment in waste management facilities. The current process involves three or more layers of public consultation and many routes of potential legal challenges. Forfás proposes an alternative planning process based on the pre-designation of Waste Management Centres. This is not a new concept being contained in the Planning and Development Act, 2000. Under this approach, potential sites for specific types of waste management projects would be identified and private or public developers could apply to establish waste management facilities. It is also proposed that incentives should be provided to compensate for perceived and real dis-amenities experienced by a community as a result of hosting a waste management facility on behalf of the wider population.

The report emphasises also the need to build consensus and improve co-ordination among all relevant bodies. The process of co-ordinating the implementation of these strategies is complicated by the fact that, currently, waste management is the responsibility of at least three separate groups:

[5] *Key Waste Management Issues in Ireland*, Forfás, December 2001
[6] *Business Leaders Survey* Undertaken on Behalf of Celtic Waste Ltd., Drury Research, March 2002.

- the Department of the Environment and Local Government, which develops overall policy;
- the local authorities who are responsible for regional waste management planning and for providing disposal facilities for domestic waste;
- the EPA, which is responsible for licensing the facilities.

To address this problem, the report recommends the creation of a National Waste Management Agency to provide the co-ordination and focus required to implement existing national, regional and county waste management strategies. It is proposed that this agency would carry out a number of functions such as:

- integrating regional and county waste management strategies into an overall national plan
- providing policy advice to the Department of the Environment and Local Government
- assisting in infrastructure investment by providing technical advice and stepping-in to assist local authorities with implementing their strategies
- initiating planning schemes for Waste Management Centres
- assisting on funding issues
- improving communications.

It is recommended that a system of Regional Waste Management Boards, to include the same local authorities that came together in the formulation of the regional waste management strategies, should also be put in place to work with the National Waste Management Agency[7].

The report points also to the need for central co-ordination in the development of funding strategies. The National Development Plan (NDP) for 2000 to 2006 proposes that €570m towards the provision of waste management infrastructure will come from PPP's. A further €127m is to be met through local authorities own resources. In addition, €127m will come from an Exchequer and EU co-funded grant scheme, intended to provide support for costs associated with the regional and local waste management strategies. However, the total capital investment of about €825m over the period up until 2006 in the NDP compares with the estimates produced by the consultants who prepared the waste management plan that investments of over €1bn will be required over the next three to four years to implement them.

The conclusions of the Forfás report can be queried on the basis that the report accepts the underlying analysis that is contained in the existing strategies and its main recommendations risk creating a new level of bureaucracy within the system that has produced those strategies. As such it is likely to reinforce existing thinking rather than introduce the necessary new perspectives. However, it is important in a number of respects.

Firstly, it clearly points out that ignoring the waste management crisis with respect to the impact on industry is not an option for Ireland. As the agency that is responsible

[7] The proposed National Waste Management Board as identified in the policy statement *Delivering Change* (DoELG, 2002) goes some way in this direction but would appear to be designed to provide advice with some co-ordination functions rather than having the comprehensive brief foreseen by Forfás. A number of other bodies are also proposed in this policy statement.

for providing advice on the industrial development of Ireland, Forfás is clearly of the view that this situation poses a major threat to Ireland's industrial development.

Secondly, the report is correct in pointing out that the pressing issue is the implementation of a widely supported and cohesive national policy for the management of waste. It is correct that this requires a comprehensive communications strategy and that some form of incentive structure is required.

Finally, the report correctly identifies the impact of deficiencies in the existing planning process and the need to implement the approach that has already been outlined.

3. Waste Volume Projections

3.1 Introduction

This section contains projections for waste production and management for the period up to 2012 in five of the most important regions on Ireland: the Greater Dublin Region, Cork, Galway, Limerick and the North East region[8] in terms of volume of waste produced. The projections divide waste into household, commercial and industrial. Estimates of waste management capacity through existing and planned landfill, recycling and thermal treatment are included. Waste management capacity is compared with the volume of waste requiring handling on the basis that the obligations on Local Authorities under the 1996 Waste Management Act mean that household waste will be given priority over other waste in available local authority landfill space.

3.2 Assumptions

3.2.1 Base Year Data

There are considerable uncertainties regarding the reliability of figures for total waste produced and handled in any given year. As a result, estimates of current waste volumes are subject to considerable and unknown margins of error. The EPA produces a dataset of annual waste, the most recent year available being 1998. The next update is currently being produced. While this covers the whole country, there are important questions regarding its reliability.

The problems arise from the way in which the data are collected. The EPA requests information from local authority landfill sites regarding the volume of waste that enters each site. There is no account taken of waste that has been recycled and, crucially, it is assumed that illegal dumping is of a negligible magnitude.[9] As a result, given that most sites have been operating at capacity, the EPA approach is, at best, an estimate of landfill capacity rather than waste produced. Furthermore, it is known that accurate weighing of waste entering legal sites is not undertaken comprehensively and that there may be reasons to believe that actual volumes exceed those that are reported at these sites.

The data that are contained in the regional waste management strategies are considered more accurate, although the EPA dataset was accessed in the formulation of these strategies.

[8] The Greater Dublin region includes the four administrative regions of Dublin along with Kildare and Wicklow. Meath is included in the North East region waste management strategy.
[9] Some estimates suggest that up to 35 per cent of hazardous waste might be disposed of illegally and is not included in these totals.

The base year values used in preparing this projection are similar to those contained in the regional waste management strategies. Most of these strategies are based on a base year estimate for 1998, although there are instances of data from both 1997 and 1998 being combined to provide base estimates. In many cases, these strategies assumed a rate of economic growth in the region of 2 to 3 per cent per annum for the years after 1998. This was clearly inadequate for the period up to 2002, and is likely to be inadequate in the future given current forecasts.

3.2.2 Relationship between Waste Generation & Economic Activity in Future

For the projection undertaken here, C&I waste is assumed to grow in line with real GDP[10]. This means that it is assumed that the waste intensity of output growth in Ireland will fall in the future compared to recent years, as discussed in the Forfás report. However, it is not accepted that there will be no relationship in the future between the rate of GDP growth and waste, as is assumed in most of the regional management strategies. This is based on the argument that Ireland differs from other countries not in the gross waste intensity of output but as regards the way in which this is handled. Figures for real GDP growth for 1998-99 and 1999-2000 are from the CSO *National Income and Expenditure* (August 2001). The growth figure for 2001 is the most recent estimate produced by the ESRI and, along with the growth projection for 2002, is taken from the ESRI's *Quarterly Economic Commentary* (December 2001). The growth forecast for subsequent years is taken from the benchmark forecast as contained in the ESRI *Medium Term Review* 2001-2007 (September 2001).

The relationship between household waste and GDP growth is expected to be somewhat more tenuous[11]. Household waste tends to grow in line with population and income growth, with the stage of economic development also being a contributory factor. However, it is affected also by trends such as increased awareness of the impact of consumer oriented packaging. Research indicates that household waste in developed EU countries with stable populations has a long-term growth rate in the region of 3.5 per cent per annum. However, Ireland's population and its income per capita has been growing at above EU rates in recent years and while future out-performance on the latter measure is likely to be less pronounced than in recent years, some recognition of increases in population is required[12].

[10] There are some exclusions for industrial waste to account for the fact that not all C&I waste enters the normal management channels. In most cases this arises because the waste is disposed of on-site, for example, through back-fill.

[11] Waste from street cleaning is included in household in this projection on the basis that it is similar in nature to household waste, it is likely to be correlated with similar growth factors, and because Local Authorities have a similar obligation under the 1996 Act to clean and dispose of street waste.

[12] Organic household waste is excluded from the projections. This has always amounted to relatively minor volumes and it is assumed that changes in waste practices will cause it to decline in the future.

3.2.3 Demographic Influences

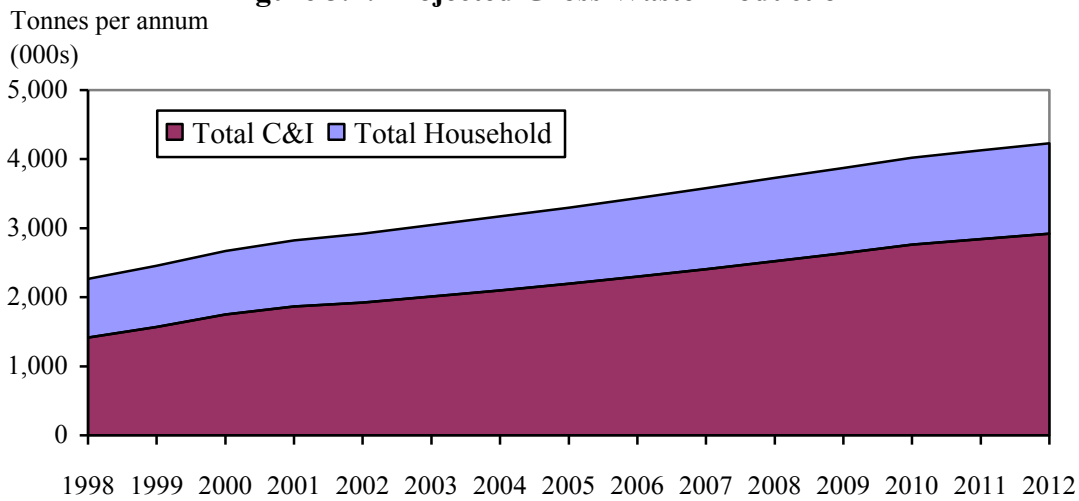
The growth projection for household waste is based on the annual forecast rate of population growth as contained in the CSO's *Population and Labour Force Projections* 2001-2031 (July, 1999), plus a percentage to allow for the static trend. This percentage is assumed to fall over the period, being equal to 3 per cent per annum in the period 1998-2003, 2 per cent per annum in the period 2003-08 and 1per cent per annum thereafter. The moderate forecast (M1F2 in the CSO projections) was adopted for population growth. This assumes that immigration remains positive but at a declining rate while fertility remains at its 1998 rate up to 2001, then declines slowly to 1.75 by 2011 and remains constant thereafter.

3.3 Projections

The resulting projections for waste growth up to 2012 are shown in Figure 3.1.

Waste arising for construction and demolition is excluded from the projections. This is an important category and accounted for up to 50 per cent of total waste disposed of in Balleally in Dublin until policy was changed last year. In effect, it is assumed that the only C&D waste entering landfills will be what is required for covering. This is in line with the regional waste strategies. However, while this may be possible to achieve, the problem is that this requires very effective recycling of this waste. While technically feasible, this may not be economically viable, as many construction projects prefer to use virgin infill. This infill is relatively easily available in Ireland compared to other countries and is an indication of the type of problem that will arise in attempting to move to recycling levels in other countries in the absence of the appropriate incentive structure.

Figure 3.1: Projected Gross Waste Production



The projections show gross annual waste produced growing from 2.2 million tonnes in 1998 to 4.2 million in 2012. C&I waste is projected to account for 69 per cent of the total in 2012, up from 63 per cent in 1998. Details of this projected growth are contained in Table 1.

3.4 Management Options

3.4.1 Introduction

The management of waste is dealt with under three options: recycling, thermal treatment and landfill. The projection for landfill capacity is based on the licences that are currently in operation or are at an advanced stage of the planning process. In addition, where applications for extensions have been made, it is assumed that these will be granted. For other sites, it is assumed that there is some flexibility built in and that actual available capacity will be in excess of the capacity indicated in the licences. To allow for this, the 'life' of each landfill site has been extended by 18 months beyond the time indicated for expiry on the licences. This is not out of line with general practice in Ireland in the past. The exception is where licences have already expired or the facility has closed because it is full.

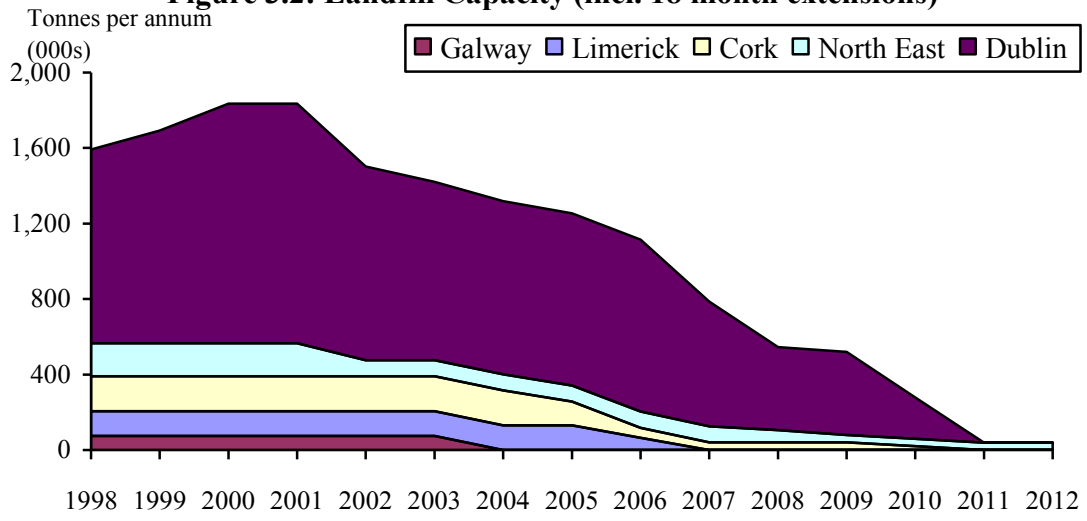
There is no guarantee that this flexibility will be available in the future given that opposition to extensions of this type has been rising in recent years. Thus, the projections leave little room for error in terms of the capacity that is available.

In addition, there are serious economic and financial implications associated with the various management options, which need to be taken into consideration, when looking to future trends. Of particular importance, in the short- to medium term is the economics of recycling in Ireland and the implications of this for how that market is to be developed and whether or not targets contained in the regional waste strategies in this regard will be achieved.

3.4.2 Landfill

Figure 3.2 illustrates the available landfill capacity in each of five regions.

Figure 3.2: Landfill Capacity (incl. 18 month extensions)



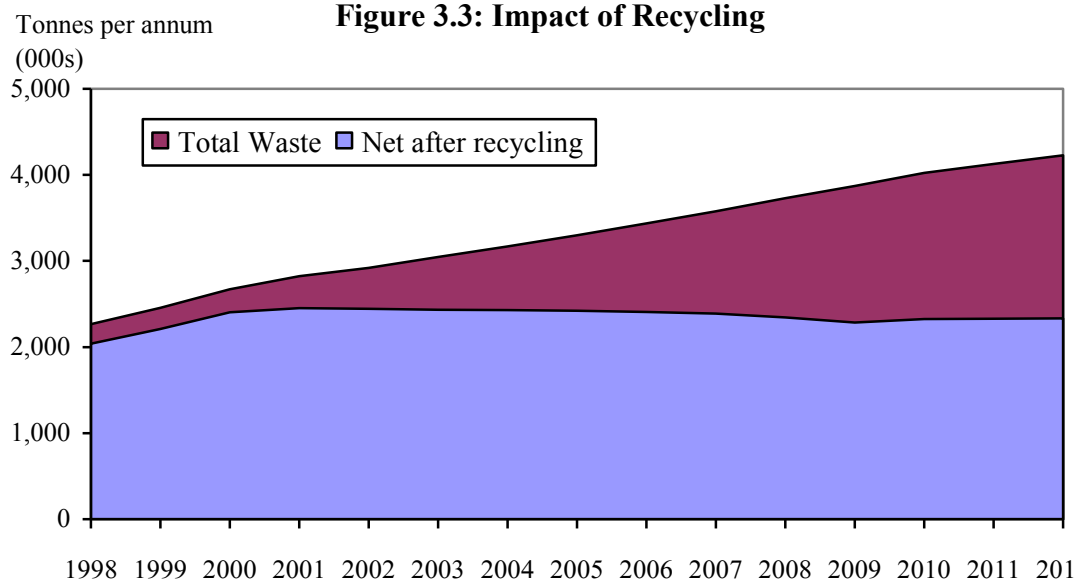
Total landfill capacity in these regions rose slightly from about 1.6 million tonnes in 1998 to an estimated 1.8 million in 2001, but has declined to 1.5 million in 2002. This rise was accounted for totally by the opening of KTK with almost 250,000 tonnes capacity per annum.

Available licensed capacity will continue to decline even allowing for extensions at facilities such as Balleally in the Dublin area. The lifetime of the Balleally facility has been extended through a sharp reduction of almost 50% in the volume of waste entering the site in the past year. This has been achieved through severe limits on non-household waste. An extension of 1 million tonnes has been applied for and this should extend the life of the facility to mid-2007 if the current intake of 230,000 tonnes per annum – down from 460,000 per annum up to 2001 – is maintained. All regions will experience declining capacity after 2004 with no landfill capacity available in County Galway after 2005 nor County Limerick after 2007. If the assumption that existing licences will be extended is dropped then these dates are brought forward by 18 months, to mid 2002 in County Galway.

3.4.3 Recycling

Regional waste management strategies place a high emphasis on recycling. In this projection, it is assumed that the targets that are set in the strategies will be achieved through progressive incremental increases from a flat base of 10 per cent in 2000. The impact of recycling on projections of total waste produced is shown in Figure 3.3 and detailed in Table 3.1. However, there are important issues that arise from the recycling target that have been set. These have been adverted to at the outset of Section 3.4 and are discussed further in Section 4. However, they do not appear to have been adequately considered in the formulation of the strategies.

Figure 3.3: Impact of Recycling

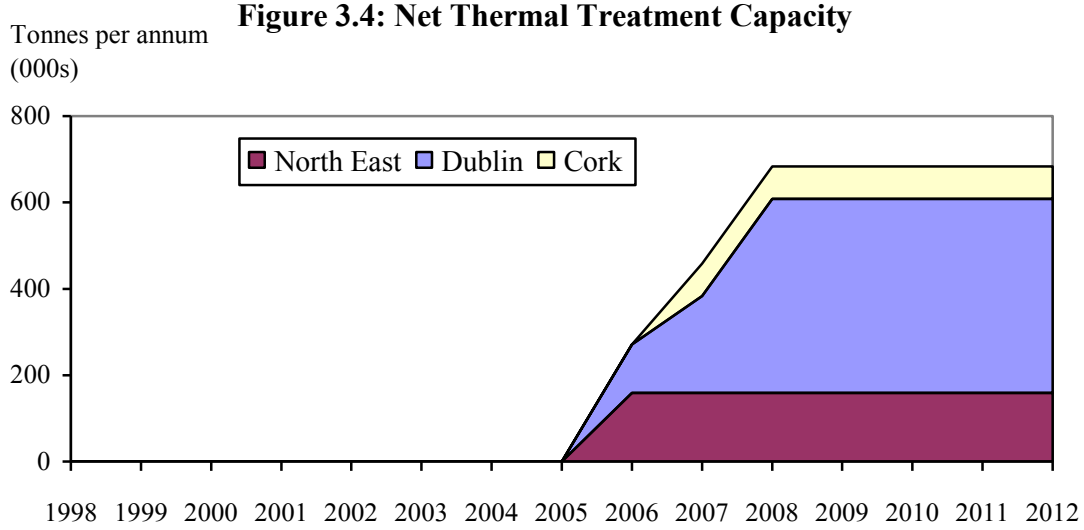


3.4.4 Thermal

Thermal treatment capacity has been proposed for a number of centres, but will not be available for a number of years and is still subject to uncertainty. The precise volume of waste that will be handled by this process is uncertain but estimates are available. As shown in Figure 3.4, this capacity will not come on stream until – at the earliest – 2005 in the North East and the Greater Dublin Area, and from 2006 in Cork.

Thermal is not final treatment, but gives rise to residues of up to 25 per cent of the gross waste handled. These reduce its overall impact on the quantity of waste to be disposed. The figures used in this projection deflate the gross planned thermal capacity appropriately to allow for this residue.

Figure 3.4: Net Thermal Treatment Capacity

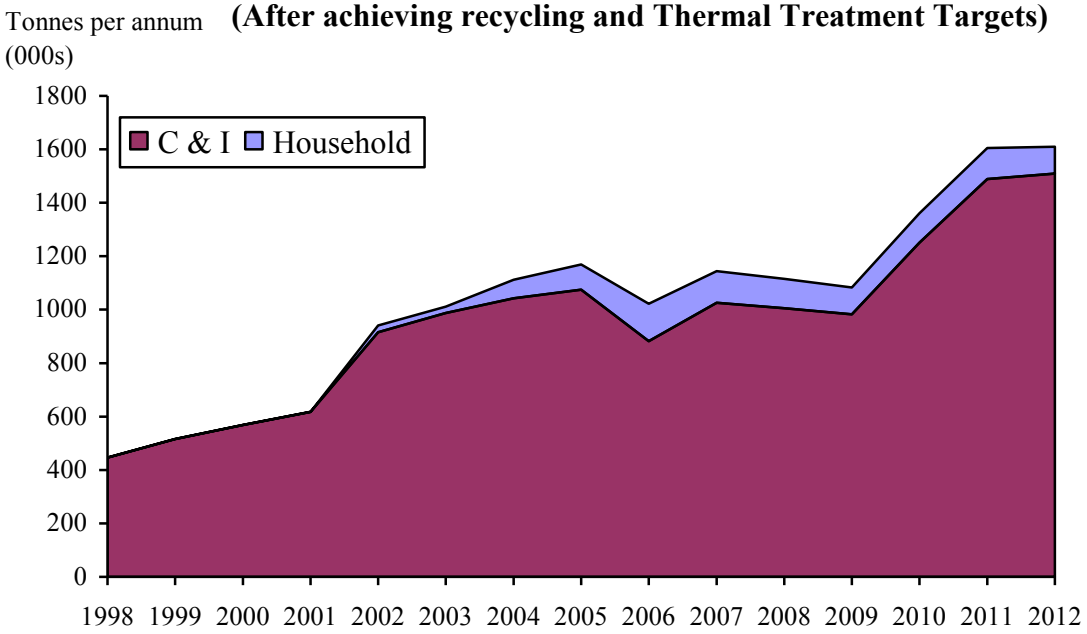


It is estimated that net capacity will build to 675,000 tonnes per annum from 2008, equivalent to just under 30 per cent of the net after-recycling volume of waste in the five regions that are considered in this study. If accurate, these projections indicate that, in 2008, thermal will amount to 33 per cent of net waste in Dublin, 25 per cent in Cork and 45 per cent in the North East.

3.4.5 Landfill Disposal Capacity

Table 3.1 contains a summary of the comparison of landfill disposal capacity with the projections for waste produced. It shows a capacity shortfall of over 940,000 tonnes in 2002. This will rise to over 1 million tonnes in 2003 and level off close to this up to 2010 when it starts to rise again. In the short term, this shortfall is equal to close to 40 per cent of the waste that remains after recycling. Furthermore, from 2002, the available capacity, including thermal and landfill, will be inadequate to deal with the amount of household waste after recycling. In these years, there will be no access to landfill for C&I waste, given available capacity. This outcome is illustrated in Figure 3.5.

Figure 3.5: Landfill Capacity Deficit: All Areas (After achieving recycling and Thermal Treatment Targets)



There are some differences in the projected outcomes between the regions with the Greater Dublin region expected to have sufficient capacity for household waste in all years, although there will be a growing deficit in relation to C&I waste. However, there are three main general conclusions. First, all regions experience substantial shortfalls in capacity of up to 100 per cent of the volume of C&I waste. Second, while these shortfalls are being experienced in most regions at present, they are about to get worse over the short to medium term in all areas. Finally, the growth in the shortfall will ease after 2005 and the situation will improve somewhat in some regions as a result of the assumed availability of thermal treatment and growth in recycling. However, no region returns to a situation of adequate capacity, although the situation in the North East region improves considerably. The shortfall within each area is illustrated in Figures 3.6 to 3.10. Detailed tables of the data that underlie these figures are contained in Appendix 2 below.

There is a clear conclusion from this analysis. Even with the full availability of the thermal capacity that is proposed, and even if recycling targets in terms of the overall percentage are met – this will involve much greater volumes than are projected in the strategies – there remains a critical deficit of capacity to handle the waste that requires disposal. This will impact primarily on C&I waste, but it cannot be addressed by increased charges since it arises even after high levels of recycling have been achieved. This crisis is imminent and already, has begun to impact.

One result of the lack of capacity has been the growth of illegal dumping in recent years. By its nature, precise measurements on this activity are not available but the evidence is that it is considerable and increasing. Certainly, the projections in the tables in Appendix 2, based on the analysis in this section, indicate that the available landfill has been inadequate to accommodate the waste requiring disposal in recent years. The introduction of the landfill levy on June 1st will provide a further incentive towards illegal disposal. This activity provides income for those acting illegally but it

certainly detrimental from the point of view of society as it is dangerous and undermines the positive work of organisations engaged in the promotion of Ireland as a modern productive base and tourism location.

There are also growing concerns among legitimate operators in the waste management industry that some operators continue to work outside the requirements of the regulatory framework. Despite well documented attempts to raise the profile of the penalties associated with illegal dumping, there is increasing frustration that little appears to have happened to deter the activity and there is little doubt that the economic benefits of operating illegally still outweigh the risks of being caught. This could deter investment by the private sector as the commercial wisdom of working within the system may be brought into question. It is therefore recommended that the role of the regulatory and enforcement bodies and the working relationship with the industry be reviewed to take these concerns on board and devise a working system that encourages and rewards operators to work within the legal framework, thus boosting confidence, incentives and investment opportunities.

Table 3.1: Projected Waste Production and Management (All Areas)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total Waste	2,265,723	2,453,801	2,670,857	2,824,345	2,919,791	3,047,396	3,170,215	3,298,115	3,435,479	3,578,752	3,728,195	3,871,993	4,021,890	4,125,683	4,228,723
Total Household	847,617	882,539	918,899	956,758	996,177	1,037,219	1,069,580	1,102,951	1,137,143	1,172,394	1,208,738	1,234,122	1,260,038	1,286,499	1,310,042
Total C&I	1,418,106	1,571,263	1,751,958	1,867,587	1,923,615	2,010,177	2,100,635	2,195,164	2,298,336	2,406,358	2,519,457	2,637,872	2,761,852	2,839,183	2,918,681
Net after recycling	2,039,151	2,208,421	2,403,771	2,452,494	2,442,796	2,432,700	2,430,629	2,422,908	2,408,450	2,388,934	2,344,488	2,285,705	2,323,670	2,327,454	2,333,061
Total thermal	0	0	0	0	0	0	0	0	271,400	458,400	683,400	683,400	683,400	683,400	683,400
Landfill required	2,039,151	2,208,421	2,403,771	2,452,494	2,442,796	2,432,700	2,430,629	2,422,908	2,137,050	1,930,534	1,661,088	1,602,305	1,640,270	1,644,054	1,649,661
Landfill available	1,592,696	1,692,705	1,834,696	1,834,696	1,502,000	1,421,000	1,319,250	1,253,500	1,115,500	786,500	545,500	519,500	279,500	39,500	39,500
Shortfall	446,455	515,716	569,075	617,798	940,796	1,011,700	1,111,379	1,169,408	1,021,550	1,144,034	1,115,588	1,082,805	1,360,770	1,604,554	1,610,161
Deficit Households	0	0	0	0	-25,354	-24,425	-68,442	-94,138	-139,141	-118,841	-110,706	-99,738	-110,268	-115,512	-101,295
Deficit C&I	-446,455	-515,716	-569,075	-617,798	-915,441	-987,275	-1,042,937	-1,075,270	-882,408	-1,025,193	-1,004,882	-983,067	-1,250,501	-1,489,041	-1,508,866
Deficit total	-446,455	-515,716	-569,075	-617,798	-940,796	-1,011,700	-1,111,379	-1,169,408	-1,021,550	-1,144,034	-1,115,588	-1,082,805	-1,360,770	-1,604,554	-1,610,161

Figure 3.6: Landfill Capacity Deficit: Greater Dublin Area (After achieving recycling and Thermal Treatment Targets)

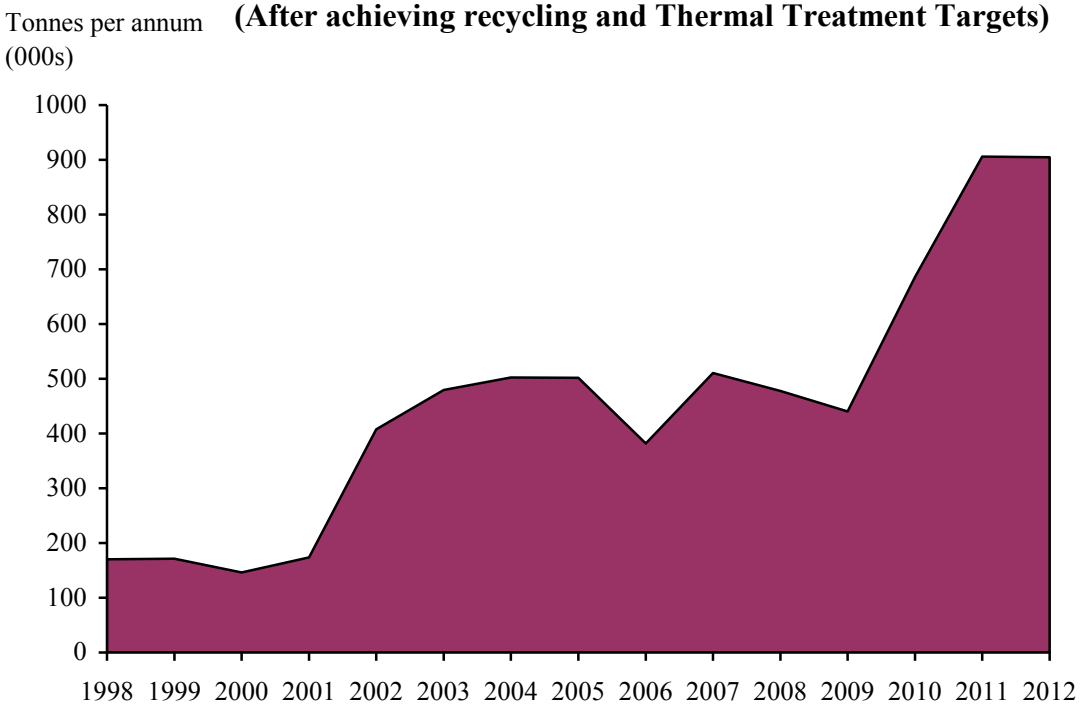


Figure 3.7: Landfill Capacity Deficit: Cork (After achieving recycling and Thermal Treatment Targets)

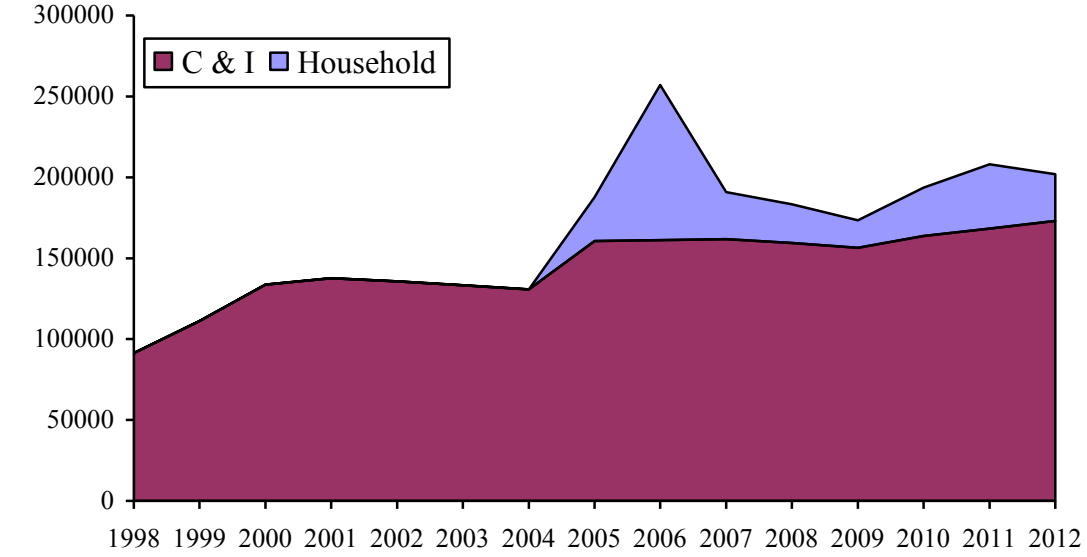


Figure 3.8: Landfill Capacity Deficit: Galway
(After achieving recycling and Thermal Treatment Targets)

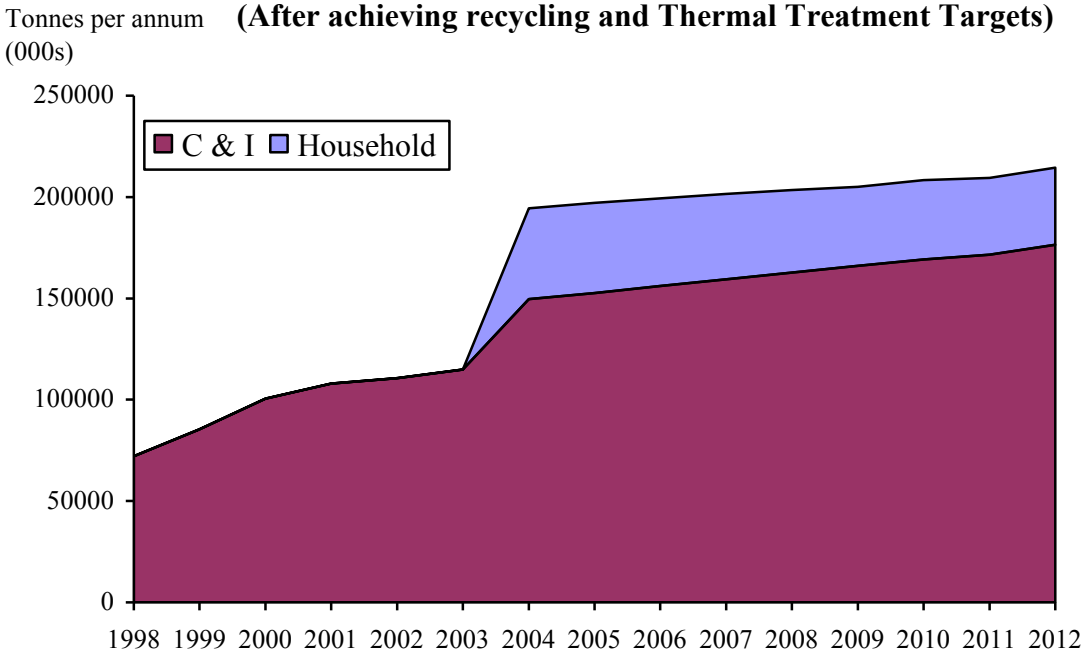


Figure 3.9: Landfill Capacity Deficit: Limerick
(After achieving recycling and Thermal Treatment Targets)

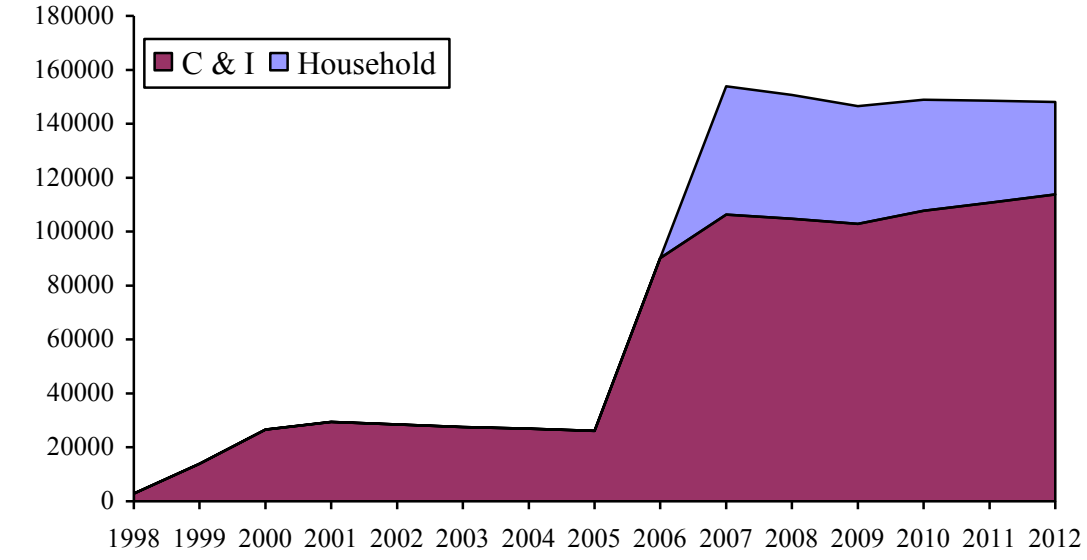
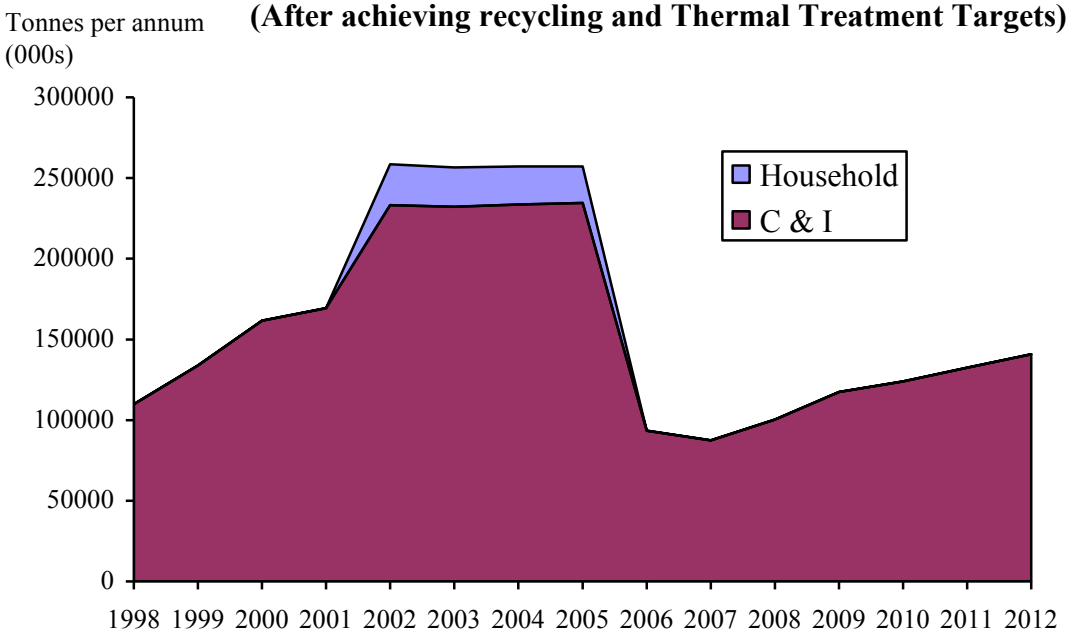


Figure 3.10: Landfill Capacity Deficit: North East
(After achieving recycling and Thermal Treatment Targets)



4. Ireland's Strategy for Recycling

4.1 Identifying Appropriate Targets

The waste management strategies were formulated to achieve targets for diversion from landfill that were set out in the policy statement *Changing Our Ways* (DoELG, 1998). These included:

- a diversion of 50 per cent of overall household waste away from landfill,
- a minimum 65 per cent reduction in biodegradable wastes consigned to landfill,
- the development of waste recovery facilities,
- recycling of 35 per cent of municipal waste,
- recycling at least 50 per cent of C&I waste within a five year period, with a progressive increase to at least 85 per cent over fifteen years,
- 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
- an 80 per cent reduction in methane emissions from landfill.

From the beginning it was known that these were ambitious targets given that over 90 per cent of Ireland's non-agricultural waste is disposed of through landfill. Two main arguments were put forward as a rationale for this approach. First, that such heavy reliance on landfill is unsustainable both environmentally and in terms of the waste of valuable resources that it implies. Second, that other EU countries are achieving recycling targets that are many multiples of what is achieved in Ireland and that even these targets would not put Ireland ahead of common practise. Working in tandem these arguments mean that the type of change that is envisaged is both essential and feasible as well as desirable.

There is no argument that this is a desirable objective and one to which Ireland should aspire. However, it is the feasibility of the targets that are most open to question. Firstly there is a contention that recycling on the scale assumed is the norm in Europe. There are a number of important issues here. For example, as shown in Table 4.1, this is far from the case and certainly while the rate of recycling in Ireland is low and similar to the UK, it is not true that recycling rates in Europe are uniformly high with Ireland an outlier.

Secondly, these targets imply a large change in behaviour and change is costly. Thus, as Ireland changes from existing practices there will be large financial and non-financial costs to be borne. Obviously, this is not the case in those countries with high recycling rates already. Condensing these costs into such a tight timeframe as envisaged means that their impact is likely to be much higher than might otherwise be the case. The risk here is that resistance to the new distribution of costs will emerge, particularly where enforcement – for example, regulations requiring a high specification of separation of household waste – is used.

Table 4.1: Household Waste Recycling Rates in EU Countries (%)

Austria	45.5
Holland	44.3
Belgium	39.5
Germany	29.6
Denmark	28.1
Finland	17.3
Sweden	15.6
Ireland	7.8
Luxembourg	7.2
Greece	7.1
UK	7.0
France	5.8
EU average	14.4

Figures relate to various years in the mid-1990s; Ireland is 1995. Recycling data for Italy, Spain and Portugal are not collected.
Source: *Department of the Environment and Local Government.*

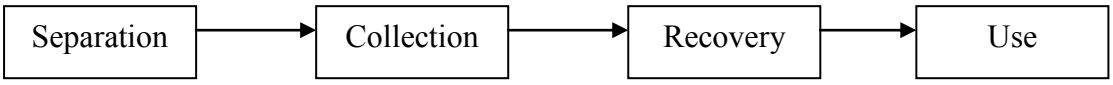
Thirdly, it is incorrect to conclude that increased recycling leads to reduced net waste. Figure 3.3 above indicates that net waste in 2012 is only marginally below its current level by about 5 per cent. This is very much in keeping with observed outcomes in Europe where over a prolonged period, increased recycling has usually managed to account only for the growth in gross waste. In other words, the need for other methods of disposal remains broadly constant in absolute terms, although falling as a percentage of the total. In fact, there is no example in recent years of a European country where net waste after recycling has been falling.

Finally, the targets have been expressed in percentage terms on the assumption that waste minimisation will keep gross waste constant. The projections in Section 3 show the extent to which this assumption is open to question. As a result, even maintaining recycling at its 1998 assumed level of 10 per cent would require a doubling of the volume of waste that is recycled.

4.2 Achieving the Targets

Recycling costs in two ways: there are the direct financial costs of collection, separation and recovery, and there are less obvious costs that arise because individuals are forced to change from what they would do otherwise. The contention is that the benefits of recycling exceed the aggregate of these costs. Even if this is true, funds are still required to pay for the direct costs that arise.

Increasing the amount of recycling that is undertaken requires that the process is broken down into its various stages and that appropriate interventions are made at each stage. Figure 4.2 shows that recycling should be broken into four distinct stages.



To date, emphasis has been placed on the initial stages of the process. Separation generally gives rise to non-financial costs for households and both financial and non-financial costs for C&I waste. The general approach taken at this stage has been to provide disincentives for other forms of waste management and, increasingly by regulation. There is little doubt that a good deal more of this type of intervention will be required if the targets are to be met and already, opposition has been growing.

The second and third stages are costly and require investments to be made. It is estimated that the cost of collecting waste for recycling is about five times the cost of other waste. The landfill levy, the shopping bag levy and landfill charges have been identified as possible sources of funding for required investments. However, the strategies only cover the capital costs that will arise and, while some local authorities such as Dublin City Council will have a rates base to draw on to fund these costs, others are uncertain where the funds will come from. Indeed, the consultations undertaken for this report indicate that direct recycling charges are being contemplated. This, clearly, would be a dis-incentive to recycle and emphasises the importance of ensuring that waste charges are set in a manner that compliments the overall strategy rather than merely reflecting operating costs or the relative scarcity of facilities.

The final stage of the process has received very little attention in Ireland. However, it is crucial. There is virtually no possibility that the process will ever be self-financing except in a small minority of cases, although sale of recovered products would make some contribution. This has been estimated to be likely to amount to about 10 per cent of the total costs incurred. ***More importantly however, when materials are recovered they must be used or else they immediately become waste again.*** The fact is that Ireland is just not in a position to do this in the short term. Most recycled materials in EU countries are transported to central locations where the economies of scale of dealing with large quantities make re-use possible. However, this will never be possible in Ireland. This is a very important issue since it places a limitation on the amount of waste that can be re-cycled in Ireland irrespective of the willingness to fund the process, and the targets that are laid out in government policy statements.

4.3 Implications for Waste Disposal Capacity and Residual Landfill

There are a few important lessons from this discussion:

- Ireland's recycling targets are ambitious by EU standards
- There are considerable financial and non-financial costs associated with recycling
- These costs are greatest during the transition phase
- A carefully designed incentive structure is required to achieve the targets
- The targets that are set will mean much greater increase in the volume of materials recovered than was originally thought
- How to use the recovered material is an important issue and will be particularly difficult to handle in Ireland.

Taken together, these points mean that achieving the recycling targets that underlie the data and conclusions of Section 3 will be very difficult, particularly over the time

period envisaged. Any shortfall in this respect will be seen in an increased demand for disposal facilities. Table 4.2 below summarises the consultants' assessment of the most likely outcomes under a number of headings, compared with the assumptions underlying the waste strategies. It is assumed in this table that all the proposed facilities for recycling and thermal treatment will be put in place[13]. On this basis, the total landfill required at 1.86 million tonnes per annum, will be approximately 1 million tonnes per annum greater, in the 5 regions covered, than is concluded in the strategies.

Table 4.2: Waste Strategy Assumptions & Projected Most Likely Outcomes (2012)

	Waste Strategies	Most Likely Outcome
Volume Growth	Current 3% growth per annum will fall to 0% over the course of the strategies. Gross arisings will grow by about 23% in 2013 over the 1998 total.	Household growth will gradually slow to grow in line with population growth. Gross arisings in 2013 will be 55% above 1998. C&I growth will slow from its recent rates and will grow in line with GDP from 2002. Gross arisings in 2013 will be over twice the 1998 level.
Recycling	45% of gross household and C&I. This will amount to 1.25 million tonnes p.a.	45% of gross would amount to 1.9 million tonnes p.a. Planned recycling would account for 30% only.
Thermal treatment	Total of 910,000, (33% of arisings). After residual, 683,000 tonnes net, 25% of the gross waste arisings.	Gross capacity volume as in strategies but net thermal treatment of 683,000 is 16% of gross arisings.
Landfill Required	22% direct and 8% residual after treatment. Total of 836,000 tonnes per annum.	54% of total arisings equal to 2.25 million tonnes per annum.

Note: Volume data in this table refer to the 5 regions – Dublin, Cork, Galway, Limerick and the North East that are included in Section 3. This includes all thermal volumes that are proposed for the whole country. Landfill Required is the subtraction of Recycling and Thermal from the total and does not mean that this landfill capacity has been planned for in the strategies.

The implications of these differences in outcome for deficits/residual landfill capacity are startling. This arises only as a result of the difference in gross waste arising in households and C&I. It should be recalled that these projections assumed that a very

[13] The recycling volumes in Tables 4.2 and 4.3 are not directly comparable with the projections in Section 3 and Appendix 2 since the projections assumed that recycling targets, which have been expressed as percentages in government policy statements, would be met. These tables assume that recycling targets, which are being interpreted as volumes in management strategies, will be met. The difference arises due to the higher gross waste arising contained in the projections in this report compared to the strategies.

effective programme for the recycling of C&D waste is put in place. Even if this assumption is maintained, there are serious doubts concerning the ability of the strategies to deliver on time on the recycling and recovery targets that have been set. It is clear that there is major opposition to thermal installations and plans are already behind schedule. Furthermore, serious doubts were raised in Section 4 of this report regarding the feasibility of the recycling targets that have been set.

It is worth recalling that the average recycling rate in the EU is 14%. If it is assumed that the EU rate rises to 20% and that Ireland manages to exceed this and recycles 25% of Household and C&I waste, rather than the 45% assumed in the strategies, then this would still represent a very successful outcome in terms of changing attitudes and practices. It would be very expensive to do this and it is unclear how this material would be then used. However, more seriously, there would be severe implications for the residual landfill requirement. The implications for residual landfill requirements under alternative assumptions regarding what can be achieved are illustrated in Table 4.3.

Table 4.3: Implications for Residual Landfill Capacity of Failure to Achieve Strategy Targets

	Landfill Required given Gross Waste Projections	
	Regional Strategies	**Most Likely Outcome**
All facilities built, targets achieved	30% of gross, 0.84 million tonnes per annum	54% of total, 2.25 million tonnes per annum
25% recycling, All proposed thermal installed	1.4 million tonnes per annum (50% of gross)	2.5 million tonnes per annum (59% of gross)
25% recycling, No thermal installed	2.1 million tonnes	3.1 million tonnes

Note: 25% of gross waste recycled equals 700,000 tonnes per annum given the projection on the growth strategies and 950,000 tonnes on the basis of the projection in this report..

There are serious challenges to be faced in regards to the installation of thermal capacity. The sensitivity in Table 4.3 is constructed on the basis that the ability to overcome these difficulties will result in all the proposed facilities being constructed, while failure to get the required permissions will mean that none of the proposals will be completed within the specified time period. Increasing the amount recycled to 25% of gross arisings and achieving thermal treatment targets would mean that landfill would fall from its current level of about 90% of gross arisings to 50% under the assumptions set out in the strategies and 59% on the basis of the projections in this report. This would mean that residual landfill would stand at 2.5 million tonnes per annum under the most likely outcome.

However, if the thermal capacity is not installed, then meeting the target of 25% recycling would increase the residual landfill requirement to 2.1 million tonnes per annum in the case of the projections in the strategies and 3.1 million tonnes given the more likely assumptions underlying the projections in this report.

These figures can be put in perspective if they are compared with current waste arisings. Table 3.1 above showed total waste in the five regions concerned and

projected on the basis of the stated assumptions that net waste after recycling in 2002 will be 2.44 million tonnes. Comparison with the figures in Table 4.3 highlights the scale of the problem. Under the most likely outcome, even if Ireland increases its recycling to 1 million tonnes per annum, thereby exceeding the EU average by a considerable margin, and puts in place all the proposed thermal facilities, the residual landfill required will be similar to what is required this year. This quantity significantly exceeds the total available licensed landfill currently available. If the thermal treatment does not come on stream as planned then the requirement will be even greater.

This is the key finding from this analysis. Under realistic assumptions regarding the growth of gross waste arisings and with ambitious but feasible recycling and recovery targets, a realistic objective is that the residual landfill requirement will stay close to the level of recent years. The only attainable alternative is that the landfill requirement will continue to rise in excess of population and GDP growth as has been the case in recent years.

A steady state objective involves a slowdown in the waste production per unit of economic activity and considerable changes in the way waste is managed. It is acknowledged that this will be costly and difficult, and it remains unclear how some of this will be achieved. However, there is no costless way in which to manage waste and a steady improvement under feasible assumptions provides the framework for the optimal strategic approach to the issue.

5. Planning and Waste Management

5.1 Existing Planning Approaches

5.1.1 The UK

The policy background for determining the land use / transportation issues associated with Waste Management Planning in the UK is provided by Policy Guidance Note No. 10 issued by the DETR. This provides advice about how the land use planning system should contribute to sustainable waste management through the provision of required waste management facilities and explains how the provision is regulated under the statutory planning waste management system. It also sets out the general policy context and the criteria for siting facilities and deals with the relationship between the planning system and the waste management licensing regime.

The policy note sets the following objectives:

a. Provide a planning framework which enables adequate provision to be made for waste management facilities to meet the needs of society for the re-use, recovery and disposal of waste, taking account of the potential for waste minimisation and the particular needs in respect of special waste;
b. Help meet the needs of business and encourage competitiveness;
c. Encourage sensitive waste management practices in order to preserve or enhance the overall quality of the environment and avoid risks to human health;
d. Have regard to the need to protect areas of designated landscape and nature conservation value from inappropriate development;
e. Minimise adverse environmental impacts resulting from the handling, processing, transport and disposal of waste;
f. Consider what new facilities may be needed in the light of wastes forecast to arise and,
g. Ensure that opportunities for incorporating re-use /recycling facilities in new developments are properly considered.

The note outlines the factors determining the factors to consider in allocating sites or the criteria for selection of sites within local strategies or in considering planning applications and the factors that may influence the location of new waste management facilities.

5.1.3 Ireland

Many Local Authorities appear reluctant to be specific about the identification of planned waste disposal facilities[14]. Consultations revealed that a number are looking at possible sites but have hesitated to identify particular sites. As a result, the planning and consultation process has not yet begun in some instances although it is recognised that existing facilities will be inadequate. For example, there is no specific reference in the Fingal, South Dublin and Dun Laoghaire Rathdown Development Plans regarding the location of new sites for waste.

The latest review of the Strategic Planning Guidelines for the Greater Dublin Area (April 2001) observes that

> 'Solid Waste Management continues to be a critical issue facing the Greater Dublin Area. Waste Management Strategies which address key issues such as waste prevention, recycling, recovery and safe disposal have been adopted by the individual Authorities in the Greater Dublin Area'.

Some initiatives to direct waste from landfill and to help meet the targets set out in the Waste Management Plan for the Dublin Region are contained in the Guidelines. These measures include:

- A new door to door collection system for dry-recyclables, which commenced in the Dublin region during the year 2000. Providing a source of funding is available, it is planned to extend this service to 80 per cent of all households in the Dublin Region.
- A Waste Management licence has been issued by the EPA for a Biological Waste Treatment Facility in Ballyogan and the procurement process has commenced. A second facility is planned for the Fingal area.
- Additional baling capacity has been commissioned.
- The procurement process for a Waste to Energy Plant on Poolbeg Peninsula is about to commence.
- A Construction and Demolition waste recycling facility is now in operation at Balleally.

This shows that there is some co-ordination between the waste strategies and other planning documents. However, it cannot be concluded that the planning guidelines provide any solutions beyond what is contained in the waste strategies. It is clear from the analysis above that additional sites for disposal will be required. However, the system has not responded to this need and any new facilities have a planning timeframe approaching 10 years before actual preparation to receive waste can begin. This is clearly a major problem that will require an alternative approach.

[14] In 1974 the Minister for the Environment advised Local Authorities in Circular Letters on site selection and on the selection and operation of their waste disposal sites but this advice would now probably be redundant. However, it does suggest that a precedent may exist.

5.2 Development of Possible Legislative Devices

Section 28 of the Planning and Development Act 2000 permits the Minister to issue Guidelines to Planning Authorities regarding any of their functions under the Act and Planning Authorities shall have regard to these Guidelines. The weakness in this section is the flexibility which "have regard to" gives to Planning Authorities who may not wish to be specific about the location of facilities.

Section 29 permits the Minister to issue Policy Directives to Planning Authorities regarding any of their functions under this Act and Planning Authorities shall comply with any such Directives in the performance of their functions. This is more peremptory device. So far it has only been used for general shopping and air quality issues but consideration might be given to its usage to require Planning Authorities to be specific regarding the location of waste facilities.

Part 9 of the Planning and Development Act 2000 – Strategic Development Zones – offers a possible approach to handle this difficulty. On the face of it, there is no apparent reason why this Section might not be utilised if it was the opinion of the Government that specified development would be of economic or social importance to the State. In this case, the Government could, by order, when so proposed by the Minister, designate one or more sites for the establishment of a Strategic Development Zone to facilitate such development. It would be necessary for the Minister to consult with any relevant development agency or Planning Authority and specify which agency would prepare the scheme, specify the type(s) of development and the reasons for specifying development and for designating the site(s). If the land is not in State ownership, a Planning Authority can use its compulsory purchase powers to acquire land or enter into an agreement with a land-owner for the purpose of facilitating the development of the land.

Certain procedures apply to the drawing up a scheme, involving an assessment of its environmental impacts and the seeking of submissions. A right of an appeal to An Bord Pleanála also exists. However, under this legislation, Planning Authorities are obliged to grant permissions in respect of schemes, which comply with its principles and no appeal lies to the Board. This does not make it watertight and a potential weakness is contained in Section 4(b)(ii), which permits a Planning Authority to decide by resolution not to make the draft planning scheme or to vary or modify a Plan.

Issuance by the Minister of Guidelines to Local Authorities requiring them to be specific about the location and capacities of waste management projects might be of help as Local Authorities are obliged to have regard to these in their functions under the Act. These might take some time to prepare and there is a certain flexibility in the term "have regard". An alternative might be that the Minister might issue a Policy Directive under Section 29 and Planning Authorities must comply with any such Directive. This might be a short-term device until Guidelines are issued (as was the case in relation to retail development). The problem with the SDZ mechanism is that whilst the Minister might propose a site or series of sites, the Members of the Local Authority might simply refuse to adopt it at which point the scheme would fail.

6. Conclusions & Recommendations

This report has been undertaken within the policy framework for waste management in Ireland as set out in various government reports over the past number of years. These reports correctly identify the over-reliance in Ireland on landfill as a primary element in waste management and identify targets for the development of alternative options. The approach taken in this report has been to examine the strategies that have been set by the bodies that are charged with implementing the necessary policies to achieve these targets and, in particular, to identify any weaknesses that exist and recommend possible solutions.

The main conclusions that are reached are that:

- The waste arisings projected in the strategies are too low and have already been superseded. On the basis of the assumptions used in this report, it is estimated that waste arisings in the five regions covered amount to over 2.9 million tonnes in 2002, an increase of 28.8% on the 1998 period. The strategies projected that the total growth in waste up to 2013 would be only 23% above the 1998 figure.
- Because there is no spare capacity allowed for in the strategies, there is a considerable deficit in terms of facilities to handle the waste that will arise over the next few years. This figure will exceed 1 million tonnes a year by 2003 even if recycling as envisaged in the strategies is achieved. This is equal approximately to the total amount of household waste produced in a year.
- The ambitious recycling targets will be difficult to achieve without appropriate incentives and management strategies thereby adding to the waste that must be handled otherwise. The strategies provide for recycling in the region of 45% of total waste. This is about 3 times the average rate of recycling in EU countries. If achieved it would also mean that Ireland would have to find a use for approximately 1.7 million tonnes of recycled material each year. This is almost 8 times the volume that was recycled in 1998, the last year for which figures are available. If this recovered material is not reused then it reverts to being waste again.
- If Ireland achieves a target of 25% recycling of Household and C&I waste – well in excess of the current EU average of 14% - and puts in place all the thermal facilities proposed, then the most likely outcome is that residual landfill requirement in 2012 will be approximately equal to the requirement in 2002.
- There is little likelihood of sufficient landfill capacity becoming available to accommodate this waste given the problems that are currently being experienced. As a result, Ireland is facing a crisis in the next few years with regard to waste disposal facilities.

Based on these findings, there is a danger that while the targets that underlie the strategies – in terms of the percentages of waste being dealt with by various methods – might be achieved in the long term, difficulties in the interim period will de-rail the process. The targets will be achieved through a combination of funding to provide alternative facilities and incentives to use these facilities. This is a workable model, but it can be short-circuited by actions such as illegal dumping. The availability of

licensed landfill facilities, priced according to an appropriate incentive structure, plus adequate penalties for non-compliance, is the best way to avoid this.

As regards the latter, there is a concern that some operators within the waste management industry are able to continue to work outside the requirements of the regulatory framework. Despite well documented attempts to raise the profile of the penalties associated with illegal dumping activity through the various media, there is increasing frustration amongst waste management operators who have chosen to work within the legal framework that little if anything has happened to deter the serial culprits. There is little doubt that the economic benefits of operating illegally still outweigh the risks of being caught.

The net effect of the current situation leaves the legitimate players at a distinct competitive disadvantage. If this is allowed to continue it could deter any further major investment by the private sector. The commercial wisdom of working within the system may also be brought into question if some companies are, in effect, allowed to operate outside the law with seeming impunity.

It is recognised universally that the waste management industry must improve its image and raise standards; however, the numerous examples of operators who continue to function outside the system are beginning to impact on the confidence of those who are working within. To overcome this and achieve optimal enforcement of regulations, it is essential that resource constraints in the EPA and in Local Authorities are addressed.

The roles of Local Authorities in waste management require clarification and rationalisation. The Local Authorities have a role in the facilitation and enforcement of waste management plans. However, there is no clarity as to what, if any, are the obligations of Local Authorities in relation to commercial and industrial waste. In addition, many local authorities are engaged directly in service provision, in relation to municipal waste. This situation can give rise to inefficiencies and conflicts in relation to the proper regulation and provision of adequate facilities for the management of commercial and industrial waste.

Strategy must be formulated in a manner that moves Ireland through what will be a difficult interim period over the next five years or so to a new system of waste management. However, inappropriate and inadequate measures in the past few years mean that the danger of derailment of the process has grown and the crisis now is greater. As a result, short-term measures are required to stabilise the situation as well as longer-term initiatives to implement the strategy.

The following recommendations have been formulated to handle this difficulty, and thereby to facilitate the achievement of the targets that have been set:

1. In relation to illegal dumping, it is recommended that the role of the regulatory and enforcement bodies and the working relationship with the industry be reviewed. The objective should be to devise a working system that encourages and rewards operators to work within the legal framework, thus boosting confidence, incentives and investment opportunities, and effectively punishing those operators who fail to comply.

2. There is a need to establish clearly, an authority which is responsible for procuring adequate waste disposal and management facilities and for their effective regulation. This applies particularly to commercial and industrial waste, in respect of which the consultants have been unable to establish any clear responsibility in this matter. The Polluter Pays Principle (PPP) is widely recognised as the best means to achieve allocative efficiency. However, in the absence of adequate regulatory oversight, clarity of responsibility in relation to facilities provision and effective enforcement procedures for non-compliance there is not a transparent means for translating this principle into practice. This issue should be addressed in the short term.

3. On the basis of available data, projections indicate that planned landfill capacity per annum over the period to 2012 will need to be approximately equal to the 2002 requirement. This level of provision would provide incentives to encourage recycling and recovery while ensuring adequate disposal capacity.

4. In the current crisis in relation to waste disposal capacity, especially in relation to commercial & industrial waste, the Minister for the Environment & Local Government should issue a Policy Directive under Section 29 of the Planning & Development Act 2000 to Local Authorities. This should require them to ensure that adequate landfill capacity is available to deal, in the short term, with the deficit in supply of commercial and industrial waste disposal capacity currently and in prospect over the next three to five years. The site selection process should, of course, be in line with relevant EU directives and EPA guidelines and any criteria contained in development plans. It is considered incorrect to assume that this would provide a disincentive to recycling in the future, since appropriate fiscal and pricing measures can be put in place irrespective of the availability of excess landfill capacity.

5. A review of waste management strategies needs to be undertaken in the short term, focussing on the assumptions that underlie them and the conclusions reached, particularly in relation to the volumes of waste that are projected. In addition, any review should contain:

    - A re-examination of recycling targets to identify how recovered materials will be used. There has been too much emphasis to date on separation of waste with little attention paid to what will be done with the recovered material and how the operation of the process will be funded in the longer term. The work of the new National Waste Management Board and the Market Recycling Forum will be important in this regard.

    - An assessment of the scope to re-use construction and demolition waste. This will be a major constraint on recycling this type of waste, irrespective of the charges that are applied for landfill. An incentive structure needs to be specified and a statement of standards to overcome concerns in relation to the appropriate and safe use of the material are required to achieve higher re-use. The National C&D Waste Council will have an important input to this assessment.

6. Revised waste management strategies, should be prepared which should incorporate the findings from the review and incorporate some contingency planning to recognise the facts that:

   - Delays are likely in putting thermal treatment infrastructure in place;
   - Recycling targets are optimistic and might not be achieved within the lifetime of the strategies and
   - Waste projections are subject to error requiring that some spare waste management capacity must always be available.

   Revised strategies should contain explicit recommendations as to what provision should be made to deal with the consequences of these events.

7. There needs to be much greater integration of waste management into local, regional and national development plans. To help achieve this in the short term it is recommended that The Minister for the Environment & Local Government should issue Policy Guidelines to Local Authorities in relation to how Development Plans should deal with waste and incorporate relevant policies from regional waste strategies. This should include guidance on pre-designation of waste management centres and other similar infrastructure. In addition, guidance should be offered in relation to how applications for the development of waste management infrastructure that is identified in development plans should be sequenced. This would increase confidence of potential developers of waste disposal and treatment facilities to purchase sites and bring forward development plans.

8. The audit trail for waste management is much weaker in Ireland than in the UK. This again puts compliant firms at a competitive disadvantage. The approach that is taken by the Irish authorities must emphasise duty of care and impose 'cradle to grave' responsibilities for waste producers. This a regulatory standard in the UK and a similar, fully audited waste tracking system should be introduced in Ireland.

9. The new National Waste Management Board has no executive powers. A single *Waste Management Agency* should be established with executive powers to plan, consult, co-ordinate and communicate waste strategy. It should be charged with preparing a national waste management strategy and with ensuring that regional strategies are consistent with this.

10. The current incentive structure, for achieving targets contained in regional waste strategies are inadequate and need to be strengthened. To this end it is recommended that:

    - An examination should be made into the feasibility of formalising and co-ordinating a system of dis-amenity payments. These have begun to emerge on an *ad hoc* basis.
    - An appropriate incentive structure should be put in place in relation to household waste, in particular, this should include the replacement of flat waste management charges with per unit or per volume charges.
    - The incentive structure, particularly as it applies to landfill charges, should be reformed to ensure that it is appropriate to achieve stated objectives rather that

reflecting the supply and demand conditions that pertain. Increased costs for landfill will not lead to increased recycling if the targets are too high but will lead to an increase in illegal dumping.

11. While some initiatives have been brought forward in relation to the funding of capital expenditure for recycling infrastructure, there have been no initiatives to identify where the funds for the operation of these facilities will come from. Currently, it appears that many local authorities will rely on landfill charges. However, this is unsustainable since this source of funds will decline as landfills close. Recycling is expensive and an alternative source of funds to pay for recycling needs to be identified.

Appendix 1: List of Consultations

Dennis O'Mahony, Director of Environmental Services, Cork Corporation

John Singleton, Head of Waste Management, Dublin Corporation

Jimmy Lynch, Director of Transport & Environment, Kildare County Council

Paul Crowe, Director of Service Environment & Emergency Services, Limerick County Council

PJ Howell, Director of Environmental Services and Parks, Fingal County Council

Greg Duggan, Senior Engineer, Meath County Council

Gary Keogh, Head of Environmental Services, South Dublin County Council

Gary O'Loughlin, Senior Executive Engineer, Galway Corporation

Katherine Walsh, Head of Environmental Services, Cork County Council

Tom Connell, Senior Executive Officer, Galway County Council

Oliver O'Loughlin, Director of Planning & Environment, Limerick Corporation

Philip Duffy, Environmental & Sanitary Services, Wicklow County Council

Áine McDonagh, Waste Management Task Force, Forfás

Appendix 2: Detailed Tables for Projections

Assumptions Underlying the Projections

The figures in Tables A1 to A5 of this Appendix are based on a set of assumptions as set out in the text. These assumptions are derived from observed experience in Ireland and in a range of other EU countries and constitute the basis on which a most likely outcome scenario can be constructed.

Base Year:
There are considerable uncertainties regarding the reliability of figures for total waste produced and handled in any given year. As a result, estimates of current waste volumes are subject to considerable and unknown margins of error. The base year values used in preparing this projection are similar to those contained in the regional waste management strategies. Most of these strategies adopt 1998 as the base year, although there are instances of data from both 1997 and 1998 being combined to provide base estimates.

C&I Waste Growth:
The rate of economic growth is the key determinant of the rate of growth of commercial and industrial waste (C&I). In this projection, C&I waste is assumed to grow in line with real GDP over the period. This means that it is assumed that the waste intensity of output growth in Ireland will fall in the future compared to recent years. Figures for real GDP growth for 1998-99 and 1999-2000 are from the CSO *National Income and Expenditure* (August 2001). The growth figure for 2001 is the most recent estimate produced by the ESRI and, along with the growth projection for 2002, is taken from the ESRI's *Quarterly Economic Commentary* (December 2001). The growth forecast for subsequent years is taken from the benchmark forecast as contained in the ESRI *Medium Term Review* 2001-2007 (September 2001).

Household Waste Growth:
The relationship between household waste and GDP growth is expected to be somewhat more tenuous[15]. Household waste tends to grow in line with population and income growth. It is affected also by trends such as increased awareness of the impact of consumer oriented packaging. Research indicates that household waste in developed EU countries with stable populations has a long-term growth rate in the region of 3.5 per cent per annum. The growth projection for the Irish population is taken from the CSO's *Population and Labour Force Projections* 2001-2031 (July, 1999), plus a percentage to allow for the static trend. This percentage is assumed to fall over the period, being equal to 3 per cent per annum in the period 1998-2003, 2 per cent per annum in the period 2003-08 and 1per cent per annum thereafter. The moderate forecast (M1F2 in the CSO projections) was adopted for population growth. This assumes that immigration remains positive but at a declining rate while fertility

[15] Waste from street cleaning is included in household in this projection on the basis that it is similar in nature to household waste, it is likely to be correlated with similar growth factors, and because Local Authorities have a similar obligation under the 1996 Act to clean and dispose of street waste.

remains at its 1998 rate up to 2001, then declines slowly to 1.75% by 2011 and remains constant thereafter.

Construction and Demolition Waste:
Waste arising for construction and demolition is excluded from the projections. In effect, it is assumed that the only C&D waste entering landfills will be what is required for covering. This is in line with the regional waste strategies.

Landfill Capacity:
Landfill capacity is based on existing licences granted by the EPA. In instances where extensions have been applied for and are at an advanced stage of being processed, the views of persons consulted in relation to the ultimate success of these applications were included. If a positive outcome is expected, the full capacity that was applied for is included. However, new proposals for landfill capacity where the site has not yet been formally identified were not included. For existing licences where no application has been made for extension it was assumed the landfill will remain in operation for 18 months after the licence expires. This is done on the basis that an extension will be granted. The exception to this is where the facility has already closed or where there is no chance of any extension being granted as the site is already full.

Recycling:
Recycling targets are as outlined in the regional strategies. In many cases, these are identified as percentage targets and, although the gross arisings projected in these tables are above those in the strategies, these percentages are adopted. It is recognised that this will imply higher absolute amounts of waste for recycling.

Recovery (thermal):
The thermal capacity is as identified in the regional strategies. Thermal treatment gives rise to about 25% residual waste. As a result, the total capacity of the treatment facilities that have been proposed is reduced by 25% in these projections.

1996 Waste Management Act:
Obligations on Local Authorities under the 1996 Waste Management Act mean that household waste will be given priority over other waste in available local authority landfill space. As a result, the calculation of the C&I deficit is on the basis that no C&I will enter the landfill until all household waste has been accommodated. This is akin to the approach that is increasingly being adopted by Local Authorities struggling to ensure that they have sufficient capacity for their own use.

Table A1: Projected Waste Production and Management (Greater Dublin Area)

Dublin total		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Household	377,297	392,842	409,027	425,879	443,425	461,694	476,099	490,953	506,173	521,864	538,042	549,341	560,877	572,655	583,135
Commercial	359,311	398,117	443,900	473,197	487,393	509,326	532,246	556,197	582,338	609,708	638,364	668,367	699,781	719,374	739,517
Industrial	408,156	452,237	504,244	537,524	553,650	578,564	604,600	631,807	661,501	692,592	725,144	759,226	794,909	817,167	840,047
Total	1,144,764	1,243,195	1,357,171	1,436,600	1,484,468	1,549,584	1,612,944	1,678,956	1,750,012	1,824,164	1,901,550	1,976,933	2,055,566	2,109,196	2,162,699
Kildare															
Household	46,730	48,655	50,660	52,747	54,920	57,183	58,967	60,807	62,692	64,635	66,639	68,038	69,467	70,926	72,224
Commercial	23,365	25,888	28,866	30,771	31,694	33,120	34,610	36,168	37,868	39,648	41,511	43,462	45,505	46,779	48,089
Industrial	30,000	33,240	37,063	39,509	40,694	42,525	44,439	46,439	48,621	50,906	53,299	55,804	58,427	60,063	61,745
Total	103,379	107,784	116,588	123,027	127,308	132,828	138,016	143,413	149,181	155,189	161,449	167,305	173,399	177,768	182,057
Wicklow															
Household	41,597	43,311	45,095	46,953	48,888	50,902	52,490	54,128	55,806	57,536	59,319	60,565	61,837	63,135	64,291
Commercial	21,280	23,578	26,290	28,025	28,866	30,165	31,522	32,940	34,489	36,110	37,807	39,584	41,444	42,605	43,797
Industrial	21,592	23,924	26,675	28,436	29,289	30,607	31,984	33,423	34,994	36,639	38,361	40,164	42,052	43,229	44,440
Total	84,469	90,813	98,060	103,414	107,042	111,673	115,996	120,491	125,289	130,284	135,487	140,313	145,333	148,969	152,528
Greater Dublin Total															
Household	465,624	484,808	504,782	525,579	547,233	569,779	587,556	605,887	624,670	644,035	664,000	677,944	692,181	706,716	719,649
Commercial	403,956	447,583	499,055	531,993	547,953	572,611	598,378	625,305	654,694	685,465	717,682	751,413	786,729	808,758	831,403
Industrial	459,748	509,401	567,982	605,469	623,633	651,696	681,023	711,669	745,117	780,137	816,804	855,194	895,388	920,459	946,232
Total	1,329,328	1,441,792	1,571,819	1,663,040	1,718,818	1,794,085	1,866,956	1,942,861	2,024,481	2,109,637	2,198,486	2,284,551	2,374,298	2,435,933	2,497,284
Total net of recycling															
Household	419,062	436,327	454,304	451,998	448,731	444,427	434,791	424,121	412,282	399,302	385,120	366,090	346,090	318,022	287,860
Commercial	363,560	402,825	449,150	462,834	460,280	458,089	460,751	462,726	464,833	466,116	459,316	450,848	472,038	485,255	498,842
Industrial	413,773	458,461	511,184	526,758	523,852	521,357	524,387	526,635	529,033	530,493	522,755	513,116	537,233	552,275	567,739
Total	1,196,395	1,297,613	1,414,637	1,441,589	1,432,863	1,423,873	1,419,930	1,413,482	1,406,148	1,395,911	1,367,191	1,330,054	1,355,361	1,355,552	1,354,441
Landfill Capacity															
Kill	330,000	330,000	330,000	330,000	440,000	440,000	440,000	440,000	440,000	440,000	440,000	440,000	220,000	0	0
Balleally	462,696	462,696	462,696	462,696	230,000	230,000	230,000	230,000	230,000	100,000	0	0	0	0	0
Ballyogan	120,000	120,000	120,000	120,000	60,000	0	0	0	0	0	0	0	0	0	0
KTK	0	100,000	242,000	242,000	242,000	242,000	242,000	242,000	242,000	121,000	0	0	0	0	0
Ballymurtagh	42,000	42,009	42,000	42,000	42,000	21,000	0	0	0	0	0	0	0	0	0
Rampere	11,500	11,500	11,500	11,500	11,500	11,500	5,750	0	0	0	0	0	0	0	0
Silliot Hill	60,000	60,000	60,000	60,000	0	0	0	0	0	0	0	0	0	0	0
Total	1,026,196	1,126,205	1,268,196	1,268,196	1,025,500	944,500	917,750	912,000	912,000	661,000	440,000	440,000	220,000	0	0
Thermal	0	0	0	0	0	0	0	0	112500	224,500	449,500	449,500	449,500	449,500	449,500
Available for C&I	607,134	689,878	813,892	816,198	576,769	500,073	482,959	487,879	612,218	486,198	504,380	523,410	323,410	131,478	161,640
C&I requirement	777,334	861,286	960,333	989,592	984,132	979,445	985,139	989,361	993,866	996,610	982,071	963,964	1,009,270	1,037,530	1,066,581
Deficit C&I	-170,199	-171,408	-146,441	-173,393	-407,363	-479,373	-502,180	-501,482	-381,648	-510,411	-477,691	-440,554	-685,861	-906,052	-904,941

Table A2: Projected Waste Production and Management (Cork)

Cork Corporation	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Household	70,159	73,050	76,059	79,193	82,456	85,853	88,531	91,294	94,124	97,041	100,050	102,151	104,296	106,486	108,435
Commercial	70,576	78,198	87,191	92,946	95,734	100,042	104,544	109,248	114,383	119,759	125,388	131,281	137,451	141,300	145,256
Industrial	28,653	31,748	35,398	37,735	38,867	40,616	42,444	44,354	46,438	48,621	50,906	53,298	55,803	57,366	58,972
Total	169,388	182,995	198,649	209,873	217,056	226,511	235,519	244,895	254,945	265,421	276,343	286,730	297,551	305,152	312,663
Cork CC															
Household	97,898	101,931	106,131	110,504	115,056	119,797	123,534	127,389	131,338	135,409	139,607	142,538	145,532	148,588	151,307
Commercial	25,132	27,846	31,049	33,098	34,091	35,625	37,228	38,903	40,732	42,646	44,650	46,749	48,946	50,317	51,725
Industrial	15,757	17,459	19,467	20,751	21,374	22,336	23,341	24,391	25,537	26,738	27,994	29,310	30,688	31,547	32,430
Total	138,787	147,236	156,646	164,353	170,521	177,757	184,103	190,683	197,607	204,793	212,252	218,598	225,166	230,452	235,463
Cork total															
Household	168,057	174,981	182,190	189,696	197,512	205,649	212,066	218,682	225,461	232,451	239,656	244,689	249,828	255,074	259,742
Commercial	95,708	106,044	118,240	126,043	129,825	135,667	141,772	148,152	155,115	162,405	170,038	178,030	186,397	191,616	196,982
Industrial	44,410	49,206	54,865	58,486	60,241	62,952	65,784	68,745	71,976	75,358	78,900	82,609	86,491	88,913	91,403
Total	308,175	330,232	355,295	374,226	387,577	404,268	419,622	435,578	452,552	470,214	488,595	505,328	522,716	535,604	548,126
Landfill capacity															
Derryconnel	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	7,000	0	0	0	0	0	0
Rossmore	120,000	120,000	120,000	120,000	120,000	120,000	120,000	60,000	0	0	0	0	0	0	0
Youghal	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	20,000	0	0
Benduff	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	6,000	0	0	0	0	0	0
Total	186,000	186,000	186,000	186,000	186,000	186,000	186,000	126,000	53,000	40,000	40,000	40,000	20,000	0	0
Cork total net of recycling		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Household	151,251	157,483	163,971	163,139	161,960	160,407	156,929	153,077	148,804	144,119	139,001	132,132	124,914	114,783	103,897
Commercial	86,137	95,440	106,416	109,658	109,053	108,533	109,164	109,632	110,131	110,435	108,824	106,818	111,838	114,970	118,189
Industrial	39,969	44,286	49,379	50,883	50,602	50,361	50,654	50,871	51,103	51,244	50,496	49,565	51,895	53,348	54,842
Total	277,358	297,209	319,765	323,680	321,615	319,301	316,747	313,581	310,039	305,799	298,321	288,515	288,647	283,101	276,927
Thermal Capacity	0	0	0	0	0	0	0	0	0	75,000	75,000	75,000	75,000	75,000	75,000
Available for C&I	34,749	28,517	22,029	22,861	24,040	25,593	29,071	-27,077	-95,804	-29,119	-24,001	-17,132	-29,914	-39,783	-28,897
Net C&I requirement	126,106	139,726	155,794	160,541	159,655	158,895	159,818	160,503	161,234	161,679	159,321	156,383	163,733	168,318	173,031
Deficit Household	0	0	0	0	0	0	0	-27,077	-95,804	-29,119	-24,001	-17,132	-29,914	-39,783	-28,897
Deficit C&I	-91,358	-111,209	-133,765	-137,680	-135,615	-133,301	-130,747	-160,503	-161,234	-161,679	-159,321	-156,383	-163,733	-168,318	-173,031

Table A3: Projected Waste Production and Management (Limerick)

Limerick Corp	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Household	26,000	27,071	28,187	29,348	30,557	31,816	32,809	33,832	34,881	35,962	37,077	37,856	38,651	39,462	40,185
Commercial	27,000	29,916	33,356	35,558	36,625	38,273	39,995	41,795	43,759	45,816	47,969	50,224	52,584	54,057	55,570
Industrial	25,970	28,775	32,084	34,201	35,227	36,813	38,469	40,200	42,090	44,068	46,139	48,308	50,578	51,994	53,450
Total	78,970	85,762	93,627	99,107	102,409	106,901	111,273	115,827	120,730	125,846	131,185	136,387	141,813	145,513	149,205
Limerick CC															
Household	29,500	30,715	31,981	33,298	34,670	36,099	37,225	38,387	39,576	40,803	42,068	42,952	43,854	44,775	45,594
Commercial	16,600	18,393	20,508	21,861	22,517	23,531	24,590	25,696	26,904	28,168	29,492	30,878	32,330	33,235	34,165
Industrial	22,589	25,029	27,907	29,749	30,641	32,020	33,461	34,967	36,610	38,331	40,132	42,019	43,993	45,225	46,492
Total	68,689	74,137	80,396	84,909	87,829	91,650	95,276	99,049	103,090	107,302	111,693	115,849	120,177	123,235	126,251
Limerick Total															
Household	55,500	57,787	60,167	62,646	65,227	67,915	70,034	72,219	74,457	76,766	79,145	80,807	82,504	84,237	85,779
Commercial	43,600	48,309	53,864	57,419	59,142	61,803	64,584	67,491	70,663	73,984	77,461	81,102	84,914	87,291	89,735
Industrial	48,559	53,803	59,991	63,950	65,869	68,833	71,930	75,167	78,700	82,399	86,272	90,326	94,572	97,220	99,942
Total	147,659	159,899	174,022	184,016	190,238	198,551	206,548	214,877	223,820	233,148	242,878	252,236	261,990	268,748	275,456
Landfill (Gortadrumma)	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	65,000	0	0	0	0	0	0
Limerick total net of recycling															
Household	49,950	52,008	54,151	53,876	53,486	52,973	51,825	50,553	49,142	47,595	45,904	43,636	41,252	37,907	34,311
Commercial	39,240	43,478	48,478	49,955	49,679	49,443	49,730	49,943	50,171	50,309	49,575	48,661	50,948	52,375	53,841
Industrial	43,703	48,423	53,992	55,637	55,330	55,066	55,386	55,624	55,877	56,031	55,214	54,196	56,743	58,332	59,965
Total	132,893	143,909	156,620	159,467	158,495	157,482	156,941	156,120	155,189	153,935	150,693	146,493	148,943	148,613	148,118
Available for C&I	80,050	77,992	75,849	76,124	76,514	77,027	78,175	79,447	15,858	-47,595	-45,904	-43,636	-41,252	-37,907	-34,311
Net C&I requirement	82,943	91,901	102,470	105,591	105,009	104,509	105,116	105,567	106,048	106,340	104,789	102,857	107,691	110,707	113,806
Deficit Household	0	0	0	0	0	0	0	0	0	-47,595	-45,904	-43,636	-41,252	-37,907	-34,311
Deficit C&I	-2,893	-13,909	-26,620	-29,467	-28,495	-27,482	-26,941	-26,120	-90,189	-106,340	-104,789	-102,857	-107,691	-110,707	-113,806

Table A4: Projected Waste Production and Management (Galway)

Galway Corp.	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Household	18,500	19,262	20,056	20,882	21,742	22,638	23,345	24,073	24,819	25,589	26,382	26,936	27,501	28,079	28,593
Commercial	50,000	55,400	61,771	65,848	67,823	70,875	74,065	77,398	81,035	84,844	88,832	93,007	97,378	100,105	102,908
Industrial	39,388	43,642	48,661	51,872	53,429	55,833	58,345	60,971	63,836	66,837	69,978	73,267	76,711	78,858	81,067
Total	107,888	118,304	130,488	138,602	142,994	149,346	155,755	162,441	169,691	177,269	185,192	193,210	201,590	207,042	212,567
Galway CC															
Household	27,647	28,786	29,972	31,207	32,493	33,831	34,887	35,975	37,091	38,240	39,426	40,254	41,099	41,962	42,730
Commercial	7,700	8,532	9,513	10,141	10,445	10,915	11,406	11,919	12,479	13,066	13,680	14,323	14,996	15,416	15,848
Industrial	20,325	22,520	25,110	26,767	27,570	28,811	30,107	31,462	32,941	34,489	36,110	37,807	39,584	40,693	41,832
Total	55,672	59,838	64,595	68,115	70,508	73,557	76,400	79,357	82,511	85,795	89,216	92,384	95,680	98,071	100,410
Galway total															
Household	46,147	48,048	50,028	52,089	54,235	56,470	58,231	60,048	61,910	63,829	65,808	67,190	68,601	70,041	71,323
Commercial	57,700	63,932	71,284	75,988	78,268	81,790	85,471	89,317	93,515	97,910	102,512	107,330	112,374	115,521	118,755
Industrial	59,712	66,162	73,771	78,639	80,999	84,644	88,453	92,433	96,777	101,326	106,088	111,074	116,295	119,551	122,898
Total	163,559	178,142	195,082	206,717	213,502	222,903	232,155	241,798	252,202	263,065	274,408	285,594	297,270	305,113	312,977
Landfill (Ballinasloe)	75,000	75,000	75,000	75,000	75,000	75,000	0	0	0	0	0	0	0	0	0
Galway total net of recycling															
Household	41,532	43,243	45,025	45,317	45,557	45,176	44,838	44,436	43,337	42,127	40,801	38,970	39,102	37,822	38,086
Commercial	51,930	57,538	64,155	67,630	68,876	71,157	73,505	75,026	76,682	78,328	79,959	81,571	83,157	84,330	86,691
Industrial	53,741	59,546	66,394	69,989	71,279	73,640	76,069	77,644	79,357	81,061	82,749	84,416	86,058	87,272	89,716
Total	147,203	160,328	175,574	182,936	185,712	189,973	194,412	197,106	199,376	201,516	203,509	204,957	208,317	209,425	214,494
Available for C&I	33,468	31,757	29,975	29,683	29,443	29,824	-44,838	-44,436	-43,337	-42,127	-40,801	-38,970	-39,102	-37,822	-38,086
Net C&I requirement	105,671	117,084	130,549	137,619	140,155	144,797	149,574	152,670	156,040	159,389	162,708	165,987	169,215	171,602	176,407
Deficit Household	0	0	0	0	0	0	-44,838	-44,436	-43,337	-42,127	-40,801	-38,970	-39,102	-37,822	-38,086
Deficit C&I	-72,203	-85,328	-100,574	-107,936	-110,712	-114,973	-149,574	-152,670	-156,040	-159,389	-162,708	-165,987	-169,215	-171,602	-176,407

Table A5: Projected Waste Production and Management (North East: Cavan, Louth, Meath and Monaghan)

North East Total	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Household	112,289	116,915	121,732	126,748	131,970	137,407	141,694	146,115	150,644	155,314	160,129	163,492	166,925	170,430	173,549
Commercial	69,588	77,104	85,970	91,644	94,394	98,642	103,080	107,719	112,782	118,083	123,632	129,443	135,527	139,322	143,223
Industrial	135,125	149,719	166,936	177,954	183,293	191,541	200,160	209,167	218,998	229,291	240,068	251,351	263,164	270,533	278,108
Total	317,002	343,737	374,639	396,346	409,656	427,589	444,934	463,001	482,424	502,688	523,829	544,286	565,616	580,285	594,880
Landfill capacity															
Basketstown	90,000	90,000	90,000	90,000	0	0	0	0	0	0	0	0	0	0	0
Corranure	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	0	0	0	0
Scotch Comer	39,500	39,500	39,500	39,500	39,500	39,500	39,500	39,500	39,500	39,500	39,500	39,500	39,500	39,500	39,500
Whiteriver	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	0	0	0	0	0
Total	175,500	175,500	175,500	175,500	85,500	85,500	85,500	85,500	85,500	85,500	65,500	39,500	39,500	39,500	39,500
North east total net of recycling															
Household	101,060	105,224	109,559	110,270	110,854	109,925	109,104	108,125	105,451	102,507	99,280	94,825	95,147	97,145	98,923
Commercial	62,629	69,393	77,373	79,731	79,291	78,913	79,372	79,712	78,947	77,934	76,652	75,077	77,250	79,413	81,637
Industrial	121,613	134,747	150,243	154,820	153,966	153,233	154,123	154,784	153,299	151,332	148,842	145,783	150,004	154,204	158,521
Total	285,302	309,364	337,175	344,821	344,111	342,071	342,599	342,621	337,697	331,774	324,774	315,686	322,401	330,762	339,082
Thermal Capacity	0	0	0	0	0	0	0	0	158,900	158,900	158,900	158,900	158,900	158,900	158,900
Available for C&I	74,440	70,276	65,941	65,230	-25,354	-24,425	-23,604	-22,625	138,949	141,893	125,120	103,575	103,253	101,255	99,477
Net C&I requirement	184,242	204,140	227,616	234,551	233,257	232,146	233,495	234,496	232,246	229,267	225,494	220,861	227,254	233,617	240,158
Deficit Households	0	0	0	0	-25,354	-24,425	-23,604	-22,625	0	0	0	0	0	0	0
Deficit C&I	-109,802	-133,864	-161,675	-169,321	-233,257	-232,146	-233,495	-234,496	-93,297	-87,374	-100,374	-117,286	-124,001	-132,362	-140,682