

DUBLIN WASTE TO ENERGY PROJECT BRIEF OF EVIDENCE

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1. Qualifications and Experience

I am Group Director Environment and Waste Management for RPS in Ireland and also Director of RPS Consulting Engineers, who since 1996 were (then as MCOS Consulting Engineers) jointly appointed with COWI of Copenhagen on various waste management studies nationally. I am a Chartered Civil Engineer, a Chartered Waste Management Engineer and a Chartered Environmental Engineer. I have led all waste management studies and projects in MCOS and RPS since 1992. I have over 30 years experience of the planning, design and development of major public infrastructure in the transport, water, waste and energy sectors.

I have been responsible for the formulation of many of Ireland's regional waste management plans including the first Dublin Regional Waste Strategy and Regional Plan 1998. I have worked as a Waste Planner since 1992 working firstly on the Wicklow Waste Strategy in 1992/1993, the Meath Waste Strategy in 1995 before commencing the Dublin Strategy in 1996. The other regional plans for which I was responsible apart from the Dublin Plan were the North East Plan (covering Counties Meath, Louth, Cavan and Monaghan), the Midlands Plan (covering Counties Offaly, Westmeath, Longford, Laois and North Tipperary), the Connaught Plan (covering Counties Galway, Mayo, Roscommon, Sligo and Leitrim) and the Limerick, Clare, Kerry Plan. All of these appointments have been following open competitive tendering under EU Procurement Procedure and assessment by different independent boards. I was also responsible for the waste strategies prepared for Galway City and County, Limerick City and County and the County Wicklow Waste Strategy and Plan (2000).

I have more recently directed the work on the National Biodegradable Waste Strategy (published April 2006), which is the most recent Government document on waste management. I am a Board Member of the National Construction & Demolition Waste Council and member of the Executive Committee reporting to the Minister for the Environment Heritage and Local Government. I am also Project Director for the DoEHLG Market Development Group Study on Recyclables and for the National Waste Management Benchmarking Report for Forfás. I have lectured extensively on waste management policy and planning in Ireland and internationally over the past 10 to 15 years.

2. Principal Points of Evidence

My evidence at this enquiry will centre on a number of key issues:

1. How the Regional Waste Management Strategy was formulated 1997/98 having regard to evolving EU and National policy which led to the content of the Regional Waste Management Plans for the Dublin Region.

2. The Feasibility Studies on Thermal Treatment separately commissioned which led to the overall approach in terms of volumes and siting.
3. The Site Selection study itself which was informed by national and international best practice together with a very proactive public engagement in the Dublin Region.

I will regard these three issues as Modules for my evidence.

In my professional view, we are now managing waste in the Dublin region to best international practice and need new infrastructural facilities like the Dublin Waste to Energy facility to help complete our modern integrated approach. The Poolbeg location was recommended as the preferred site following a robust siting procedure carried out to best international practice.

In my professional view, this is the correct technology on the correct site as part of an overall integrated approach to waste management in Dublin.

Module 1 of 3

Formulation of Dublin Region Waste Management Strategy and Regional Plan

1. Background

In late 1996, Dublin City Council on behalf of the four Dublin local authorities (Dublin City Council, Fingal County Council, South Dublin County Council and Dun Laoghaire Rathdown County Council) advertised a consultancy brief for the formulation of a new Dublin regional waste strategy. MC O’Sullivan and Co. Ltd. Consulting Engineers (later RPS Consulting Engineers) together with COWI Consulting Engineers and Planners of Copenhagen, the City of Copenhagen EPA and KPMG - known as MCKK Consultants – were appointed in late 1996 to undertake the required study.

The brief called for a review of the waste management strategy for the Dublin region in the context of the Waste Management Act 1996, the then National Recycling Strategy (1994) together with current and draft EU waste directives. Also central to the brief were the objectives of Best Practicable Environmental Option (BPEO) and Best Available Technology Not Entailing Excessive Cost (BATNEEC). The brief specifically referred to the “*desirability of dealing with solid waste in so far as possible within the Dublin region*” and also sought to have a strategy outcome to achieve a sensible balance between cost and environmental considerations.

2. Objectives of the Strategy Study.

The principal aims of the study covering technical, environmental, institutional and financial aspects were outlined as follows:

- To determine and assess the current situation in the Dublin region with regard to the quantity and nature of the various wastes arising and to waste management practices then at that time.
- To recommend an integrated waste management strategy for the future management of these wastes in accordance with up-to-date legislative and emerging environmental policies.
- To recommend the most appropriate organisational and funding mechanisms for the future management of wastes in the Dublin region.

The horizon year for the study was defined as 2016. However recognising that the waste management strategy is a very dynamic process with new and emerging technologies, the modeling exercise was developed up to 2011, which would represent a total of three Waste Management Plan periods, assuming that plans were adopted for the successive five year periods.

3. Public Consultation Process and Response.

Immediately following our appointment in January 1997, we invited public comment on “how Dublin should handle its waste”. Public notices were placed in all the national papers and local freesheets announcing commencement of the study at the beginning of February 1997. This was accompanied by a short Briefing Document (Appendix A to this brief) outlining how the study would be carried out and the opportunities for public consultation. Editorial coverage was widespread and wholly positive in the national and local print and electronic medias. It focused on three points:

- The four Dublin Local Authorities were united in their approach to the problem of waste management.
- The proactive approach to public consultation.
- The fact that this was a new approach to promoting, seeking and implementing improvements in waste management.

Submissions, many of them very substantial documents, were received from forty-five householders, twelve non-governmental organisations, thirty-seven governmental / public representatives and thirty-nine commercial organisations. Acknowledgements and where appropriate, more detailed replies to all submissions were made during the course of the study.

A website was set up and this facility publicly advertised (www.dublinwaste.ie). This website has in fact been updated many times and was used from 1997 to accept public comments on the formulation of the new waste management strategy and further developed in 1998 to facilitate a public “*conversation*” on the development of the first Dublin Region Waste Management Plan and subsequently in recent years again for public submissions and comments on the second generation Waste Management Plan which was adopted in 2005.

Following the initial round of consultation in February / March 1997 a further round was carried out over the summer period from June 1997 to October 1997 which involved public displays in council offices of the four Authorities and in the various shopping centres across Dublin. These displays (typical example in St Stephens Green Shopping Centre shown overleaf) asked the people of Dublin to “*help us develop a strategy that works for Dublin*” and included a questionnaire which people were requested to fill in and return to the consultants. This leaflet and questionnaire is attached in Appendix B of this brief of evidence. The replies to these questionnaires were analysed and taken into account during the formulation of the strategy.

The third phase of public consultation took place on the Report on Waste Management Strategy prior to work commencing on the formulation of the Waste Management Plan in 1998. During this stage of consultation, another similar leaflet to the previous one published during the summer of 1997 was again circulated in early 1998 (Appendix B). This one was titled “A fresh approach for managing Dublin’s waste” and gave the outline of the waste management strategy which was the proposed basis for the new regional plan, targets for reductions in waste growth rates together with recycling and energy recovery targets for the period 1998 to 2004. In the questionnaire attached to this leaflet there was a specific question “*Do you agree that thermal treatment with energy or heat recovery is more acceptable than landfill?*” It is noteworthy that regardless of the source of the questionnaire replies from any of the four local authority areas, that the answer to this question was invariably “yes” – in fact some 80% of the household replies were of the view that thermal treatment with energy or heat recovery was more acceptable than landfill.

It should be noted that throughout 1997 and 1998, when the Waste Strategy and Plan was being formulated respectively, both the national media and political reaction to the Regional Plan was quite positive and there was majority political acceptance of the Plan in all four Dublin local authority areas including Dublin City Council.

4. Scope of Waste Strategy Study.

The strategy study was broken down into four specific areas, each of which required integrated expertise between the Irish-Danish consortium of consultants.

The four main elements of the strategy study were:

- Phase 1- baseline study which involved surveys of the existing waste arisings and existing composition together with a survey of existing practices in dealing with the waste streams involved.
- Phase 2 – technical and environmental studies: these examined the range of technical issues to be considered in the development of a future waste management strategy. These issues covered waste trends, future waste minimisation, waste projections, options for recycling and recovery, pre-treatment technologies including biological and thermal treatment and finally disposal options.



- Phase 3 – integrated study of waste management scenarios: these involved the development of a range of practical regional scenarios incorporating recycling, pre-treatment and disposal options for Dublin. These scenarios were required to comply with the legislative requirements and to satisfy the anticipated future requirements of EU Directives and national policies as they were emerging. Each scenario involved a coordinated programme of actions involving community and waste producer initiatives for waste minimisation, recycling and recovery

- facilities, together with new regional waste pre-treatment and disposal facilities. Each scenario was considered from the point of view of technical and environmental performance, cost and sustainability.
- Phase 4 – recommendations and action plan: these involved deriving conclusions for the optimum short, medium and long term waste management strategy, based on implementing the best practicable environmental options (BPEO) for waste management with details of future investments and operating costs.

It was recognised that a sustainable waste management system must rely on proven and well established technologies. In addition the following aspects were critical to the strategy formulation:

- Community role in waste management: local authorities would have a central role in supporting waste minimisation and environmentally sound waste management practices at waste producer and community levels. This would involve practical assistance, educational and technical support and ongoing interactions.
- Waste management obligations: common regional action by the four Dublin local authorities in the implementation of appropriate organisational and institutional arrangements to meet their waste management obligations in relation to waste producers, waste collectors and waste disposal operators.
- Funding and economic instruments: the future management of waste in the Dublin region will involve significant additional capital investment and operational expenditure. In accordance with the “*Polluter Pays Principle*”, the funding options were examined. It was considered that some form of waste charging system would be necessary. These charges would have to reflect the cost of environmentally sustainable waste management practices. This approach would also require economic instruments in the form of disposal charges, possibly supported by national initiatives such as landfill taxes, in support of waste minimisation and recycling / recovery in preference to landfill disposal.

5. Structure of Dublin Waste Management Strategy Study Report.

When the Strategy Study was completed in December 1997, it was immediately brought before the Elected Members of the four Dublin Local Authorities at a joint meeting in early January 1998. At that point, the strategy study which comprised four separate documents was published and placed in the Dublin Public Libraries where it remains to this day.

The four report documents, each dated December 1997, were as follows:

- Executive Summary.
- Strategy Report.
- Main Technical Report.
- Technical Studies and Dublin Waste Model.

The contents pages of these four reports are reproduced in Appendix 4 to this briefing paper.

6. Drivers for Future Waste Management Strategy for the Dublin Region.

The principal driver for waste management planning was the then recently enacted Waste Management Act 1996 which required local authorities to discharge a range of functions in relation to waste management administration, governing the obligations of waste producer, waste collection and the treatment and disposal of waste as follows:

- Waste management planning.
- Waste regulation.
- Service provision.
- Controlling the operation of service providers.

I now propose to describe the requirements in waste management planning terms to comply with national policies and either adopted or emerging EU directives. In addition, local authorities were empowered under the Waste Management Act 1996 to regulate waste producers (household or commercial / industrial) through the enactment of bye-laws on waste presentation, segregation at source, thresholds for sorting, etc. They are required to regulate the collection of all waste in their administrative areas through a system of permits issued to approved waste collection organisations, while certain other waste treatment and disposal facilities would be operated under licence from the EPA.

There was also a requirement under the Waste Management Act 1996 for producers of waste to have due regard to the need to prevent or minimise the production of waste. The Environmental Protection Agency Act 1992 empowered the Agency to carry out environmental audits and make provision for integrated pollution control licences in respect of scheduled industries. It was a requirement for the granting of a licence that the Best Available Technology Not Entailing Excessive Cost (BATNEEC) would be used to limit, abate or reduce emissions. It was recognised in the Strategy Study that waste reduction was best achieved if aimed at total eco-management approaches i.e. conserve water, reduce waste, save energy all at the same time.

When the new Waste Management Strategy was being formulated in 1997 the national and EU guidelines then existing were as follows:

- National Recycling Strategy (1994) had a general objective for recycling of 20% of combined household and commercial waste by 1999, together with progress to meet the EU Packaging Directive. (National recycling at that time was only about 5% against the target of 20% but the Dublin strategy published in December 1997 took a much more ambitious view of the need to satisfy emerging EU targets and indeed a strong public / political demand to maximise recycling.)
- The EU Packaging Directive had been adopted in 1994 which sought 25% recycling to be achieved by 1st July 2001 and between 50% and 65% of packaging waste to be recovered in Ireland by 2005.
- A Draft Landfill Directive was first published in 1991 and sought to have increasing amounts of biodegradable municipal waste diverted from landfill until no more than 25% of Europe's biodegradable municipal waste (from base year 1993) was being landfilled, while the remaining 75% was diverted to recycling and recovery operations. The latest version of this Directive was published by the EU Commission on 5th March 1997 and was used in the strategy formulation. This set progressive targets for the years 2002, 2005 and 2010 for the diversion of from 75% of total biodegradable waste by 2002 reducing to 25% by 2010.

Subsequent revisions to this Draft Directive altered the timelines but not the substance of what was proposed.

As can be seen from the foregoing, the principal thrust of EU policy in 1997 was not only waste recycling but primarily landfill diversion through a combination of wastes recovery (i.e. thermal treatment) and recycling of waste materials. This thrust of EU policy was the cornerstone of the new government waste policy “Changing Our Ways” published by Government in October 1998. The Dublin waste management strategy approach published in January 1998 could be said to have anticipated this new government policy (which remains in place to this day). Nevertheless, what I am describing here is the basis for the Waste Strategy for the Dublin region which preceded the publication of “Changing Our Ways” and on which the integrated approach, including a new thermal treatment plant, was grounded.

In summary, the principal drivers of the new waste management approach for the Dublin Region were a combination of legislative and policy requirements together with seeking the Best Practicable Environmental Option (BPEO) for wastes in the region. This BPEO was derived through the consideration of various waste management scenarios, some involving thermal treatment and some not including it.

7. EU Policy Drivers

The EU Framework Directive on Waste (91/156/EEC) is the enactment requiring waste management plans to be drawn up by the EU Member States. This requirement was transposed into Irish law by the Waste Management Act of 1996 which required individual local authorities or groups of authorities to prepare a county or regional waste management plan. Section 22 of the Act outlines what should be contained within such a plan.

The Dublin Waste Management Strategy was intended to act as a policy platform for the first and indeed subsequent five year waste management plans over a 15 to 20 year horizon.

In formulating a regional policy, regard was made of the Waste Management Act requirements for the subsequent plan and in addition that this strategy would have to meet the long term requirements of the EU Directive on Packaging Waste (94/62/EEC) and the proposed Directive on the Landfill of Waste (this Directive was eventually adopted at EU level in 1999).

In the implementation of the Directive on Packaging Waste in Ireland, the five year objective to 2001 was stated as follows:

- 25% recycling rate to be achieved for 1st July 2001.
- Between 50% and 65% (by weight) of packaging waste should be recovered in Ireland by 2005. (Within this general target, between 25% and 45% (by weight) of the total amount of packaging materials contained in packaging waste had to be recycled with a minimum of 15% (by weight) for each packaging material).

Under the national system, as part of the industry’s response to the Packaging Directive, the company REPAK had a remit to ensure the recycling of 27% of municipal packaging

waste by July 2001. The March 1997 proposal from the EU Commission on the Landfill Directive had the following targets:

- By 2002, biodegradable municipal waste going to landfills must be reduced to 75% of the total amount (by weight) of biodegradable municipal waste produced in 1993.
- By 2005, biodegradable municipal waste going to landfills must be reduced to 50% of the total amount (by weight) of biodegradable municipal waste produced in 1993.
- By 2010, biodegradable municipal waste going to landfills must be reduced to 25% of the total amount (by weight) of biodegradable municipal waste produced in 1993.
- Member States shall ensure that used tyres and shredded used tyres will not be accepted at landfills respectively two and five years from the date of the directives enforcement.

It was realised in 1997 that waste management in the Greater Dublin Area was going to be dictated by a number of factors, primarily:

- Existing and expected future and national and EU waste policy and strategy.
- Limitations in establishing landfill disposal capacity.
- Public acceptance of recycling and treatment technologies as part of an integrated waste management scheme.
- The urgent need for funding in terms of household waste charges or other economic instruments and in accordance with the Polluter Pays Principle.

In deciding policy in 1997 it was critical to be aware of the consequences of choosing different objectives before a decision could be arrived at. Examples of the different objectives could be:

- a) Fulfilling the quantifiable national and EU recycling targets and other targets.
- b) Having maximum realistic recycling as the main waste management objective.
- c) Having maximum realistic reduction of waste to be landfilled as a primary objective.

Apart from fulfilling EU and national policy objectives, it was obvious from the wide-ranging public engagement carried out over the course of 1997 that the public wished to see maximum recycling as soon as possible, while at the same time a substantial reduction in landfill. At the end of 1997 there was long-running major public opposition to two new greenfield landfill sites in Counties Wicklow and Meath (Ballinagran and Knockharley respectively) and both proposals were eventually surrendered to the private sector who succeeded in getting both sites licensed and opened in 2003 and 2006 respectively. Even extensions to existing sites were meeting with very substantial public opposition. In September 1997, Fingal County Council took the unprecedented step of actually withdrawing a licence application to the EPA for an extension to Balleally landfill such was the public furore, following mass demonstrations of many thousands of people in the north county towns of Swords and Lusk. A site selection study was then undertaken to find an alternative site and this process though commenced in 1998 is only now concluding in 2007. Whether from a policy viewpoint, or if one listened to the people of Dublin, the compelling message was that landfill was the last resort and that they wished to see maximum recycling also.

10. Alternative Treatment Scenarios Considered.

As part of the Strategy formulation, detailed studies were conducted on a range of technologies – biological (Composting and Anaerobic Digestion) and thermal (Refuse Derived Fuel, Incineration, Gasification, Pyrolysis and Liquification) in addition to various collection systems for hazardous and non-hazardous waste and recyclables in particular. These studies all fed into the overall strategic approach that informed the scenario modelling which resulted in the recommended strategy.

Four alternative development scenarios for waste management in Dublin were considered as follows:

- Scenario 1: Mandatory recycling according to national and EU recycling targets plus proposed landfill directive.
- Scenario 2: Maximum realistic recycling.
- Scenario 3: Mandatory recycling according to national and EU recycling targets plus proposed landfill directive with thermal treatment.
- Scenario 4: Maximum realistic recycling with thermal treatment.

The genesis of these scenarios derives from consideration of the need to meet EU Directive targets and also to reduce landfill due to limited space and the clearly expressed public perception that landfill is the last resort. The scenarios were therefore constructed to test the ability of different approaches to meet the requirements.

Scenarios 1 & 2 would result in reaching mandatory Irish and EU recycling targets but not seeking maximum diversion from landfill. Scenarios 3 & 4 would achieve the same recycling levels as scenarios 1&2 respectively but in addition, would seek maximum diversion of waste from landfill through the introduction of bulk waste reduction methods such as thermal treatment. Each scenario covers management of waste generated at households, commercial and industrial enterprises as well as from construction and demolition activities. New survey data on household and commercial waste then coming available from specific Dublin City Council and MCKK surveys together with verifications of general waste arisings data were used to model calculations. In addition priority waste streams were handled and tracked in each scenario to include end-of-life vehicles, tyres, batteries and electrical equipment.

The modeling exercise was undertaken by COWI in Denmark based on data collected in Dublin by MCOS. To enable the actual cost analysis and assess the environmental and technical consequences of the scenarios, each scenario needed to be transformed into actual waste management streams. Each was defined in terms of collection, recycling and recovery / disposal facilities and their implementation timetable. The four scenarios were described in relation to the actual methods / technologies for these collection, recycling, transport, treatment and disposal methods. The most relevant feasible methods of collection, treatment and disposal were used in the development of the models. The cost model assumes that hazardous wastes have been removed from the household waste stream prior to disposal.

Scenario 1 - Mandatory Recycling plus Draft Landfill Directive Compliance (No thermal treatment)

This scenario is the minimum approach to meet the national recycling target in 1997 of 20% of household and commercial waste as well as other quantitative recycling targets

set out in EU Directives. The EU Draft Landfill Directive would have required that 75% of biodegradable waste had to be diverted from landfill by 2010. It was concluded that materials recycling and biological treatment would not achieve this diversion target based on international experience.

Scenario 2 – Maximum Realistic Level of Recycling (No Thermal Treatment)

This scenario sets up a target for the maximum practical level of recycling of selected material from the waste stream. This will promote recycling to the maximum achievable level exceeding the mandatory levels where this is reasonably possible. It was assumed with this scenario that all practicable recycling schemes would be operational from the year 2000.

Scenario 3 - Mandatory Recycling plus Draft Landfill Directive Compliance plus Efficient Bulk Waste Reduction Treatment.

Scenario 3 covers scenario 1 plus the introduction of an efficient bulk waste reduction treatment method. Thermal treatment is the most efficient method to reduce the volume of residual waste before final disposal. In this scenario, the model uses calculations and evaluations of waste incineration with heat recovery. It was assumed that the thermal treatment plant could be in operation by the year 2002 however, biological treatment of organic waste would not proceed with this scenario as it would be thermally treated.

Scenario 4 – Maximum Realistic Recycling plus Efficient Bulk Waste Reduction Treatment.

Scenario 4 covers scenario 2 plus the introduction of thermal treatment as a bulk waste reduction method. However to maximise recycling, biological treatment of biodegradable waste would also be introduced thus reducing the extent of thermal treatment by incineration or other methods.

In addition to considering the various collection, treatment and disposal schemes required in all four scenarios, the cost and environmental implications of each scenario were also considered. For each scenario, calculations were made of the required capital costs, the costs of operation of collection schemes and treatment / disposal facilities as well as the revenue from the sale of products or energy. The cost of transportation was also included. The total costs and benefits (revenue) in each year of the planning period 1997 to 2011 were calculated giving an annual cash flow. These costs cover handling and disposal of wastes from all waste producers. The costs for handling and disposal of all municipal wastes for which Local Authorities were responsible were included in addition to other wastes for which the private sector was responsible. To compare the costs and benefits involved in each scenario the net present value (NPV) of the annual cash flows over the 15 year period is calculated. This figure is the discounted value of the future payments. All costs and revenues are calculated and fixed base year prices (1997) and the discount rate used is what was the then loan (prime) rate minus the inflation rate (loan interest rate 6.5%, minus inflation rate 1.3%, giving this discount rate of 5.2%).

The NPV for each of the four scenarios were IR£507 million, for scenario1, IR£500 million for scenario 2, IR£566 million for scenario 3 and IR£596 million for scenario 4. A sensitivity analysis was undertaken to see how the costs would be affected by such variables as loan rate, collection scheme efficiency, the sale of heat recovery, the price of paper and cardboard and transport costs.

A comparative environmental assessment was carried out on the four scenarios having regard to global warming potential, acidification, nitrification and photochemical ozone formation. The environmental parameters included in the study were CO₂, SO₂, NO_x, methane, particles, water emissions, odour and noise in addition to heavy metals, dioxins and BOD (from emissions to water). The various environmental impact categories studied represented the essential environmental problems connected with modern waste management systems. The conclusion reached was that scenarios 3 & 4 represented a lower potential environmental load than scenarios 1 & 2. The main reason for this is the lower use of landfill and the energy utilisation of waste through thermal treatment plus extended recycling of waste materials. In particular, global warming or climate change considerations favoured the introduction of thermal treatment with energy recovery as a means of maximising the diversion from landfill.

11. Overall Comparison of Scenarios.

9.1 Environmental Considerations.

It was found that scenarios involving landfill disposal of large amounts of organic materials would contribute significantly more to global warming than scenarios involving thermal treatment or recycling of the same materials. Methane generation at landfills is the main reason for this. Diversion of organic waste and maximum reuse of resulting energy can mitigate this impact.

Methane gas generation at landfills is also the main contributor to photochemical ozone formation. Scenarios involving landfill disposal of large amounts of biodegradable materials therefore contribute more to this photochemical ozone formation than scenarios where organic materials are recycled or thermally treated.

It was not considered that the relative emissions of NO_x, SO₂, dioxins or heavy metals from thermal treatment would result in significant environmental issues provided EU threshold values were met having regard to other sources of these emissions.

In conclusion, scenarios having high levels of recycling of organic materials and thermal treatment will result in a lower relative potential environmental load than those scenarios involving more landfill.

Finally, in terms of residual waste, there is no more efficient method to divert waste from landfill, coupled with maximum energy recovery, than to incinerate the residual.

9.2 Economic Considerations.

It was noted that scenarios involving thermal treatment resulted in the highest net present values (NPVs) of investment over the fifteen years, however these were also the scenarios with the highest revenues (from the sale of heat). It was noted that kerbside collection was an expensive source separation method. However the most intensive Bring Schemes did not appear to provide the same service to the householder to meet the required targets and we were mindful of the public consultation messages at the beginning of the strategy which favoured maximum recycling. We were convinced that if kerbside collection were set up on an economic basis in the Dublin Region that it would succeed in diverting substantial quantities from landfill at an economic cost to the householder.

Considering the total costs in each of the scenarios over the entire planning period of fifteen years there was a nominal difference of 19% between all four. In addition, the sensitivity analysis showed that the comparison remained relatively robust as variables changed. It was noted that increased energy costs would further favour thermal treatment with energy recovery and could balance out the cost differences between various scenarios.

It was concluded that the differences in costs between the various scenarios were not so significant that they should prevent the best environmental option from being adopted. Therefore scenario 4 was recommended as the Best Practicable Environmental Option (BPEO). To achieve maximum recycling it would be necessary to have maximum source segregation both for dry recyclables and organic wastes from all sources and its subsequent treatment to produce marketable products. The overriding requirement for the Dublin Waste Strategy was that the legal requirements could be satisfied at affordable cost. Consideration of the requirements of the Packaging Directive, and the then Draft EU Landfill Directive convinced us that thermal treatment combined with maximum recycling was the best and most secure option to satisfy these requirements. The recommended waste management scenario for the Dublin Region therefore included the following elements:

- Collection system
 - kerbside collection of recyclables with source segregation in all four Local Authorities areas supplemented with collection via Bring Banks and areas which could not be serviced by kerbside collection;
 - provision of recycling stations that catered for the recycling of other waste streams;
 - source segregation and dual collection of organic waste as far as practicable (80% collection efficiency);
 - source separation of the waste stream for all private enterprises in accordance with bye-laws;
 - source separation of harmful waste in the household waste stream.

- Treatment system
 - increased baling capacity for residual waste disposal at Arthurstown;
 - provision of materials recycling facilities for both public and private sectors;
 - garden waste composting to service the requirements of each of the four Authorities;
 - biological treatment of organic wastes in at least two regional facilities, initially piloted at Ballyogan;
 - thermal treatment of residual combustible waste with waste-to-energy recovery (500,000 to 700,000 tonnes per annum);
 - facility for priority wastes and harmful wastes collection from households;
 - construction and demolition wastes facilities with maximum diversion of soil from landfill to conserve available capacity;

- Residual Disposal Systems
 - landfill disposal of residual waste. Initially household and commercial waste to utilise Arthurstown as far as practicable and existing Balleally

facility with requirement for a new unbaled landfill facility to meet the requirements by 2011.

12. Formulation of Waste Management Plan for the Dublin Region.

The Dublin Waste Management Plan was also prepared by the MCKK consultancy group under the guidance of the Dublin Waste Strategy Coordination Group (Mr. Matt Twomey, Chairman and Mr. John Singleton, Project Engineer). The preparation of the Draft Waste Plan commenced in 1998 and the Draft Plan was put on public display in July 1998 for a statutory period of two months. In terms of public consultation, there were two displays in each Local Authority area, consisting of a complete copy of the plan, book of drawings, plan summaries and leaflet incorporating a questionnaire. The plan was distributed to all of the Public Representatives in the Region and to the Public Libraries. It was also available for purchase. In total forty-nine submissions and one hundred and seventy five completed questionnaires were received from the public.

The Waste Management Plan for the Dublin Region was formally adopted by Dublin City Council on 7th December 1998 and by the other three Local Authorities within a month or two following that. However, as some amendments had been made by the Elected Member in Fingal County Council, it was necessary for the Fingal County Manager to re-adopt the plan in September 2001 under the Waste Management (Amendment) Act 2001. In effect, the Dublin Waste Strategy Study dated December 1997 was transposed into the legal format of a Waste Management Plan as required by Section 22 of the Waste Management Act 1996. There was no substantive difference between both documents except that the Strategy Study was more detailed and outlined the many considerations that informed the final recommendations which were incorporated into the Dublin Waste Management Plan..

13. Replacement Dublin Plan made on 11th November 2005

The first Dublin Waste Management Plan formally adopted by all four Dublin authorities in September 2001 was subject to review under the Waste Management Act 1996. Accordingly the four Dublin Authorities held an EU competition for consultants to prepare a replacement Dublin Waste Management Plan. The purpose of the review was to assess progress made to date on the fifteen year strategy proposed in the Strategy Study, and to refocus the Plan towards waste prevention and recycling to assist further in meeting the regional targets. It also reviewed newly emerging technologies like Mechanical Biological Treatment (MBT) and confirmed the position with regard to planning procedures then underway for many waste infrastructural projects including Dublin WTE.

14. National and EU Waste Policy.

Since the Dublin Strategy Study and Waste Management Plans were adopted, including the current Waste Management Plan, the Government has issued a number of statements of policy on the management, prevention, recycling and recovery of waste. In my considered and experienced view, the current proposal for a waste to energy facility as part of an integrated waste management approach conforms to these statements of Government policy.

Current Government waste management policy is based on the policy statement “*Changing Our Ways*” issued by the then Minister for the Environment Heritage and Local Government in September 1998. This policy document was in fact published after the Dublin Waste Management Strategy was published. The Dublin Strategy was the first attempt by any region to develop a waste management strategy and was subsequently endorsed by the 1998 *Changing our Ways*.. In Section 5.3 of *Changing our Ways* the regionalisation of waste management strategy between neighbouring Local Authorities is strongly encouraged “*for the development of integrated and innovative waste management solutions*”. The policy furthermore states “*while landfill disposal of residues will always be required, mass burn waste-to-energy is effective in diverting over 70% of municipal waste away from landfill and if properly controlled has a considerably lower environmental impact than landfill*”.

In March 2002 the Government issued a further policy statement “*Preventing and Recycling Waste: Delivering Change*”. While this policy statement was primarily focused on waste prevention and recycling, it also re-states that “*emphasis must be given to the widest practicable realisation of waste prevention, minimisation, reuse, materials recycling and biological treatment, before energy recovery through thermal treatment and final disposal in landfill*”. This policy statement also builds on the commitment in “*Changing Our Ways*” to gradually introduce use-related charges in waste management. These proposals for user charges were first introduced in public policy by the Dublin Waste Strategy having regard to the increased costs required to fund a new integrated waste management system for the Dublin Region where household charges were not then in existence.

In April 2004, the Government issued a further waste management policy statement “*Taking Stock and Moving Forward*”. This statement outlined progress to date on the implementation of regional waste management plans and noted in particular the slow progress with regard to the provision of thermal treatment. While progress was noted in the Dublin area, the other regions were minded “*to give early consideration to how they envisage accelerating progress towards meeting the objectives of their waste management plans in relation to Thermal Treatment*”. There was particular concern at diminishing landfill capacity in most regions including the Dublin regions. It was of course recognised that “*thermal treatment with energy recovery has a role to play as one element in the integrated approach to waste management*”. This reflects the integrated approach taken in the Dublin region also.

In April 2006 the *National Strategy on Biodegradable Waste* was published. This Strategy stated that “*thermal treatment with energy recovery in accordance with internationally accepted waste management hierarchy is a key element of Irish waste management policy. The ten waste management plans for the regions / counties of Ireland recognised the integrated policy role of thermal treatment and facilities have been proposed by Local Authorities for the treatment of residual waste within six of the regions. This method provides a robust technology for dealing with mixed residual waste and forms a necessary element in the integrated waste management plans of the six regions, similar to models from other EU countries such as Germany, Belgium, Holland, Austria and Denmark*”. In the Strategy, two broad options are described as currently available for residual waste treatment – Thermal Treatment and Mechanical Biological Treatment (MBT). It is further stated that neither system should be seen “*as an alternative to the separate collection and recycling policies set out in this Strategy*”.

The Strategy further stated *“even allowing for the achievement of the very ambitious prevention, recycling and biological treatment targets for biodegradable municipal waste (BMW), the estimated total amounts of residual BMW generated ranges from 951,221 tonnes to 1,276,337 tonnes per annum nationally over the period 2010 to 2016. As Mechanical Biological Treatment (MBT) is a stabilisation of biodegradable waste, it is a pre-treatment method for either landfill or incineration and since the organic material recovered by MBT “typically emerges as a low quality material – “stabilised biowaste” – that has limited applications” thermal treatment is recognised in the strategy as the preferred treatment system for residual biowaste post recycling. Furthermore, since the National Biodegradable Waste Strategy favours source separation of BMW, this does not sit particularly well with MBT which caters mostly for non-source separated waste. Outside of Dublin though, where universal collection systems do not exist, there is certainly a role for MBT where a 2 or 3-bin system is neither economic nor practical in dispersed rural areas. To process the residual waste through an MBT system in those circumstances would provide useful pre-treatment of biodegradable waste prior to landfill. However, this is unlikely to reduce public opposition to such landfills or indeed public opposition to MBT as in the Cork region in the past ten years or so. This method of pre-treatment also requires most landfill space, which is more likely to be available in rural counties outside of the major cities.*

In the National Development Plan (NDP) 2007 to 2013 *“Transforming Ireland – A Better Quality of Life for All”* there is a specific reference to Thermal Treatment in the context of reducing *“our reliance on landfill as a method of waste disposal”*. The NDP goes on *“in line with national policy on the integrated approach to waste management, thermal treatment with energy recovery will be the preferred option for dealing with residual waste after achieving ambitious targets in respect of waste prevention, recycling and recovery.....In the case of the Dublin Region, the relevant Authorities are proceeding by way of a public-private partnership for which the necessary statutory approvals are being sought”*. The NDP lists thermal treatment under *“Central Government Investment Priorities”* wherein it is stated that, under the Waste Management Sub-Programme, some €750 million will be invested in dealing with the problem of legacy landfills and supporting the recycling and recovery effort.

The most up-to-date relevant statement of Government policy on waste was published in recent weeks. The National Climate Change Strategy 2007 to 2012 according to the Taoiseach *“builds on the commitment to sustainable development set out in “Towards 2016” and the National Development Plan 2007 to 2013 and is one of a number of integrated Government initiatives that will address energy and climate change issues. These include the White Paper on Energy, the Bioenergy Action Plan and the forthcoming Sustainable Transport Action Plan. Taken together, these measures will support environmental sustainability, underpin our competitive position and enable us to meet our global responsibilities.”*

In furtherance of these objectives, the Climate Change Strategy seeks to reduce Ireland’s greenhouse gas emissions by over 17 million tonnes of carbon dioxide equivalent in the period 2008 to 2012. A range of measures in various parts of the economy are identified which will reduce our carbon footprint in the years ahead. Chapter 9, which deals with waste management, refers to the *“priority given to the diversion of waste from landfill”*. A specific objective of the Government plan is the implementation of the National Strategy on Biodegradable Waste (2006) based on the integrated waste management approach established as Government Policy in *“Changing*

Our Ways” in 1998. Under the heading “Residual Treatment”, this is stated to mean Thermal Treatment with energy recovery or by way of Mechanical Biological Treatment”. The clear policy preference of using Thermal Treatment with energy recovery as the preferred option for residual waste is very obvious from the following paragraph in the Strategy:

“While substantial volumes of municipal waste will be diverted from landfill as a result of high levels of recycling and biological treatment, significant quantities of residual waste will remain. To maximise the recovery of useful material and energy from residual waste, the National Strategy on Biodegradable Waste identifies Thermal Treatment with energy recovery as the preferred option in most waste management plans adopted by Local Authorities. The National Strategy on Biodegradable Waste also recognised, particularly in the shorter term prior to the development of adequate thermal treatment capacity, a potential role for Mechanical Biological Treatment (MBT)”.

The document goes on to state *“in accordance with the methodologies developed by the Intergovernmental Panel on Climate Change (IPCC), the CO₂ emissions resulting from the combustion of biodegradable waste are considered to be carbon neutral and are not counted for the purposes of Kyoto obligations. In addition, generation of heat and electricity from waste in Thermal Treatment plants reduced the need to produce this energy from fossil fuels and will therefore displace CO₂ emissions from these sources. By exploiting an indigenous energy source, waste-to-energy plants make a contribution to national security of energy supply. In the current process of revising the Waste Framework Directive (2006/12/EC), mechanisms are being considered which would encourage waste-to-energy plants to increase efficiency to a level comparable to conventional power plants, thereby allowing the energy content within waste to be transformed into electricity and heat for beneficial use in accordance with Best Available Techniques. The Government supports this approach in the context of the waste hierarchy which will minimise climate impacts through the sustainable management of waste.”*

From the foregoing review of statements of Government policy over the period 1998 to 2007, there is no doubt that the proposed waste to energy facility as part of an integrated approach to the management of waste in the Dublin Region fully conforms with Government policy, not only in relation to waste management, but also in relation to the Government’s energy policies.

Module 2 of 3

Feasibility Study for Thermal Treatment of Waste for the Dublin Region (including facility size and wastes available for thermal treatment)

1. Background.

The December 1997 Strategy Report by MCCCK Consultants recommended a feasibility study on site selection process in advance of detailed planning of the proposed thermal treatment plant for the Dublin Region. From page 73 of the Waste Strategy Report it was stated that all major new facilities would involve considerable planning to include “feasibility / preliminary design including siting options, site selection, technical, environmental and cost analysis and recommendations for a specific project.”

In April 1998, the four Dublin Local Authorities advertised for consultants in the European Journal to carry out a Feasibility Study for the Thermal Treatment of Waste in the Dublin Region. In May 1998, M.C.O’Sullivan & Co. Ltd., with COWI of Copenhagen, the Vienna University of Technology and Vestforbraending of Copenhagen together with Professor Judith Petts of the University of Loughborough and Professor Dr. A.A. Beenackers of the University of Groningen in the Netherlands made a joint submission to Dublin City Council on behalf of the four Authorities. An independent board recommended our appointment and we commenced work in Autumn 1998.

2. Scope of Study

The study brief dictated that we were required to address the following issues:

- Waste streams volumes and characteristics;
- Technological options;
- Environmental impacts;
- Life-cycle analysis;
- End market users for energy and residual products;
- Siting;
- Examination of representative facilities in other countries;
- Procurement procedures;
- Public consultation and involvement.

3. Similar Facilities Abroad.

At the start of the study it was considered necessary to look at representative facilities abroad and therefore in November 1998 the following modern waste-to-energy facilities were visited in a number of capital and large cities in Europe:

- Tysely, Birmingham, England;
- AVI, Amsterdam, The Netherlands;
- Vestforbraending, Copenhagen, Denmark;
- Amagerforbraending, Copenhagen, Denmark;
- KARA, Copenhagen, Denmark;
- Spittelau, Vienna, Austria.

These facilities were researched in terms of history, siting, technical features, operational arrangements, degree of adjacent recycling facilities and overall emissions on residues. From these visits we got an overall appreciation of thermal treatment facilities which were operating satisfactorily in Europe. Our examination of thermal facilities however did not extend solely to incineration plants. At that stage, the thermal treatment market in Europe and indeed across the world was opening up into non-

incineration technologies such as gasification, refuse derived fuels (RDF/MBT) and pyrolysis. We therefore had to have regard to these new emerging technologies, some of which were at pilot plant and indeed laboratory stage while others were being tested on a commercial scale for the first time.

In August 1998, M.C.O'Sullivan & Co. Ltd., had also been appointed by Meath and Limerick County Councils to carry out a Feasibility Study on Thermal Treatment / Recovery Options for two other regions in Ireland – the Mid-West and North-Eastern Regions who were also examining thermal treatment as a waste management option but within the overall plant size range, 150,000 tonnes to 250,000 tonnes per annum, i.e. about half the size of the Dublin plant as proposed. As the studies for the North-East and South-West Regions were being conducted with grant aid from the European Cohesion Fund through the Department of the Environment and Local Government at the time, permission was sought and granted from our clients to extend the information from these regional studies into the Dublin studies also. As part of the regional studies, a number of site visits were organised to non-incineration technologies in Europe, these facilities were as follows:

- THIDE Environment Process in Chartes, near Paris;
- Preussag-Noell Pyrolysis Process at Burgau in Germany;
- TTS Fluidised Bed Gasification near Florence in Italy;
- Thermoselect Gasification Process in Karlsruhe, Germany.

The essential difference between incineration, gasification and pyrolysis is shown on the next page in terms of temperatures used and the products produced.

By way of comparison with conventional incineration plants of this scale, we also visited the Stoke-on Trent incineration plant in England and Pirmasens incineration plant near Frankfurt in Southern Germany. The conclusions of the Regional Report were that while gasification appeared to offer environmental advantages over traditional incineration that it was not yet a process sufficiently proven as a treatment method for municipal waste. The Karlsruhe plant was the only one of commercial scale but it was experiencing various operational difficulties following commissioning in 1999.

Furthermore we found that Pyrolysis was a developing technology which might have suitable future potential at a smaller scale but was not suitable as a bulk treatment method for municipal waste. The overall conclusion of the Regional Studies therefore was that waste combustion or incineration with energy recovery was the only safe, tried and tested technology, capable of meeting stringent environmental standards and that a procurement process should proceed to seek the economically most advantageous tender taking environmental considerations into account but also with regard to pre-set technical, environmental and financial criteria. A siting study was also carried out in these regions, which recommended a shortlist of possible towns based on pre-determined siting criteria.

4. Format of Feasibility Study Reports.

The Feasibility Study was reported in two separate parts as follows:

- Technical Report dated September 1999 on Available Waste Streams, Technology Types, End Market Use, Environmental and Cost Assessment, Financing and Procurement Aspects and Siting Criteria;
- Report on Siting and Environmental Issues dated November 1999 covering Environmental Impacts, Review of Health Issues, Public Involvement Process, Development of Siting Criteria, Shortlisting of Sites, Procurement, Planning Procedures, Conclusions and Recommendations.

5. Study Recommendations.

The overall conclusions and recommendations of the September 1999 report was placed before the Elected Members at a presentation on September 14th 1999 in the Gresham Hotel, as follows:

- The EU Waste Hierarchy should be respected with Thermal Treatment forming part of an integrated approach where waste reduction and recycling including biological treatment are given priority.
- Waste Combustion or Incineration with Energy Recovery is a safe, tried and tested technology capable of meeting stringent EU environmental standards.
- Gasification and Pyrolysis are emerging Thermal Treatment technologies which are continuing to be developed towards the required scale likely to be appropriate in the Dublin Regional context.
- Implementation of the Dublin Waste Strategy will require prioritisation of waste reduction and recycling including biological treatment. The waste quantities available for treatment are in the range 450,000 to 700,000 tonnes per annum having regard to these priorities.
- Consideration needs to be given to the construction of two thermal treatment plants within the capacity range 250,000 to 400,000 tonnes per annum as part of the siting study. Within each plant the layout should be modular with flexibility for additional lines in accordance with the European practice in major cities. Having at least one or two plants however must continue to remain options pending completion of the detailed siting study.
- If a decision is made later in 1998 to construct two plants, the first such plant should be advanced immediately to bring it onstream by 2004 with a second thermal treatment plant by 2006.
- The first such plant should be procured using the Design, Build, Operate procedure and preferably be owned by the four Dublin Authorities secured through a PPP process.
- A proactive public involvement process is recommended locally at the preferred site to outline the environmental advantages to thermal treatment as an element in the integrated approach to the management of Dublin's waste.
- Draft siting criteria to be input into the public involvement processes are, land zoning, proximity to the source of waste, traffic considerations, potential for exploiting the energy produced, end market use and general planning and environmental considerations.
- This report should join the Dublin Strategy Report and the Waste Management Plan in the Public Libraries for public examination and comment.

The whole issue of the facility size and therefore ultimately the number of facilities in the Dublin Region was the cause of much internal debate in the study team during the

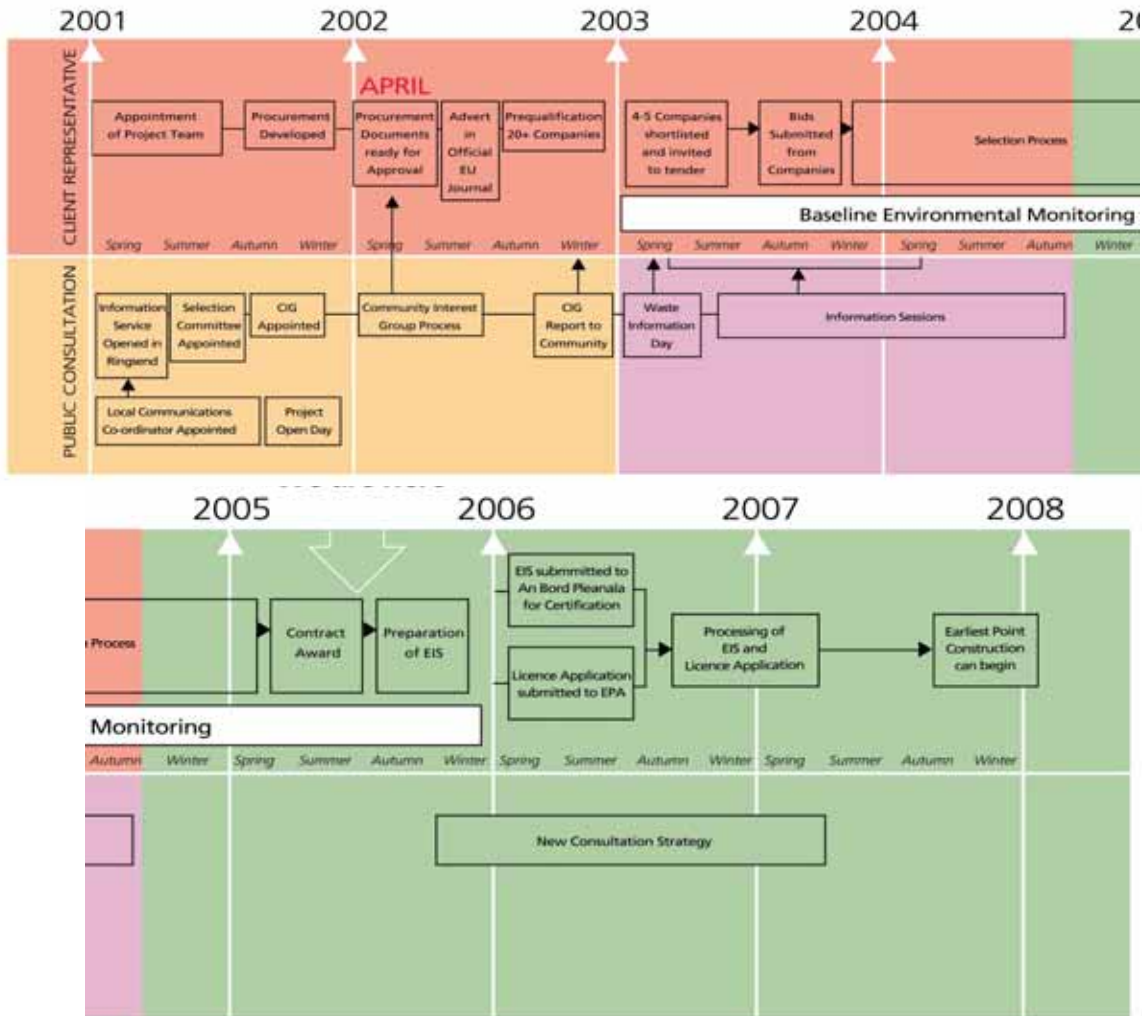
Summer and Autumn of 1998. While there were emerging technologies of a non-incineration type to be seen in Europe, there was insufficient track record in these facilities for the treatment of municipal waste and certainly not on the scale required in Dublin. Nevertheless there was a strong view among our team, which I personally shared, that we should leave the technology option open and indeed the facility size to see what the procurement process would offer in terms of the number and size of plants and the relative location. For that reason in the PPP procurement process Dublin City requested proposals within the size range 400,000 – 600,000 tonnes per annum and left site selection open for consideration also. During the course of 1999, we were getting conflicting reports on the relative success or otherwise of the gasification plant at Karlsruhe in Germany which was sized for 225,000 tonnes and was commissioned early in 1999. There was huge political interest in Ireland in this plant and large numbers of City and County Councillors from Ireland traveled to see it as a possible alternative to incineration.

We as consultants to many of the Local Authorities were under a great deal of pressure to endorse this plant as the way forward, something we resisted, but at the same time agreed that it was an interesting alternative process which needed at least medium term operation to show sufficient track record before it could be recommended here. It was that possibility of an alternative technology at a smaller scale involving a greater number of plants in the Dublin Region that led us in the Summer of 1999 to consider the possibility of two smaller plants and this was documented in our September 1999 report. However, by the time the final report on the Feasibility Study for Thermal Treatment in the Dublin Region was issued in November 1999, we had concluded that the optimum recommendation was to proceed with the procurement of a single larger plant to handle the available demand within the range 450,000 to 700,000 tonnes as outlined in the Dublin Regional Waste Management Plan and that this plant should be procured using a PPP process for the recommended site option in the report, i.e. the Poolbeg site as the preferred option with alternative sites at Robinhood, Cherrywood and Newlands also identified as “most suitable for thermal treatment” but in that order of preference.

The results of the Feasibility Study for the Thermal Treatment of Waste for the Dublin Region was presented to the Elected Members of the four Dublin Authorities on November 30th 1999 in the Gresham Hotel. The results of public opinion surveys in the Dublin Region through eight Community Focus Groups over Summer 1999 was also presented together with a preferential ranking of four sites at Poolbeg, Robinhood, Cherrywood and Newlands in that order. At the same presentation, recommendations were made for the shortlisting of sites for biological treatment and residual landfill in the Dublin Region showing the ongoing commitment of the Dublin Local Authorities to the Integrated Waste Management Plan on a regional basis.

One of the recommendations of the Feasibility Study was to set up a local Communications Office in the Poolbeg area to engage with and inform local people on how the project would be developed further. The graphic on the next page (Figure 1) shows the various steps in the local consultation process up to the present time. Also shown overleaf is a photograph of the Community Interest Group which was set up locally to discuss community aspects of the proposed project.

Figure 1 Timeline Dublin Waste to Energy Project Development and Consultation



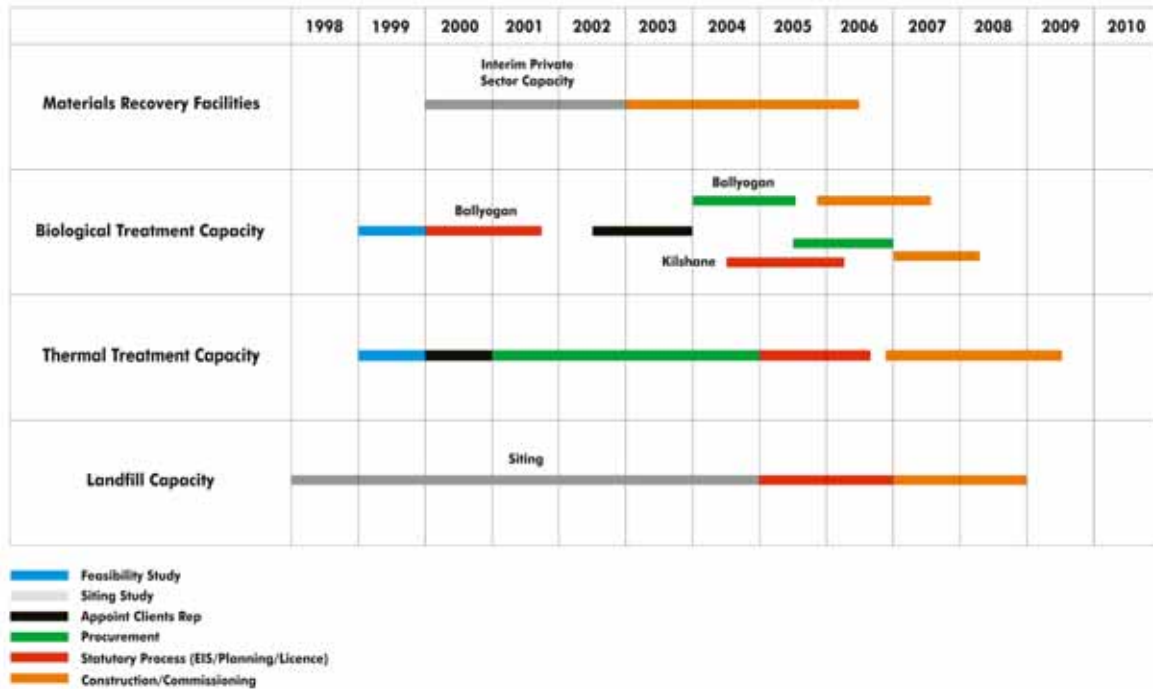
**Community Interest Group (CIG) Meeting in Poolbeg
6. Plant Capacity and Wastes Available for Thermal Treatment.**

The Feasibility Study for the Thermal Treatment of Waste in the Dublin Region reported in September 1999 that if the Dublin Waste Management Plan was implemented that there would be between 481,000 and 522,000 tonnes of waste available for thermal treatment in the region having regard to implementation of the other elements in the Plan. The application before An Bord Pleanála is for a plant of 600,000 tonnes per annum capacity.

The original Dublin Waste Plan period up to 2006 has expired and we are now in the period of the second generation Waste Management Plan for the Dublin Region 2005 to 2010. Having regard to the waste arisings generated in 2005 /2006 in the Dublin Region, the timing of implementation of various elements (Figure 2), and the need to preserve the integrated approach it was recommended that a capacity between 400,000 tonnes and 600,000 tonnes per annum would be required for the treatment of non-recyclable residual waste.

In the remaining sections of this brief I propose to look at current waste arisings in the Dublin Region both in household and commercial / industrial terms, the overall progress made on recycling, the capacities already reserved in recycling facilities including biological treatment plants and the residual waste available for pre-treatment before landfill. The waste tonnages now reported here are consistent with the up-to-date Dublin Waste Management Plan 2005-2010.

Figure 2 Integrated Local Authority Development of Facilities for Municipal Waste

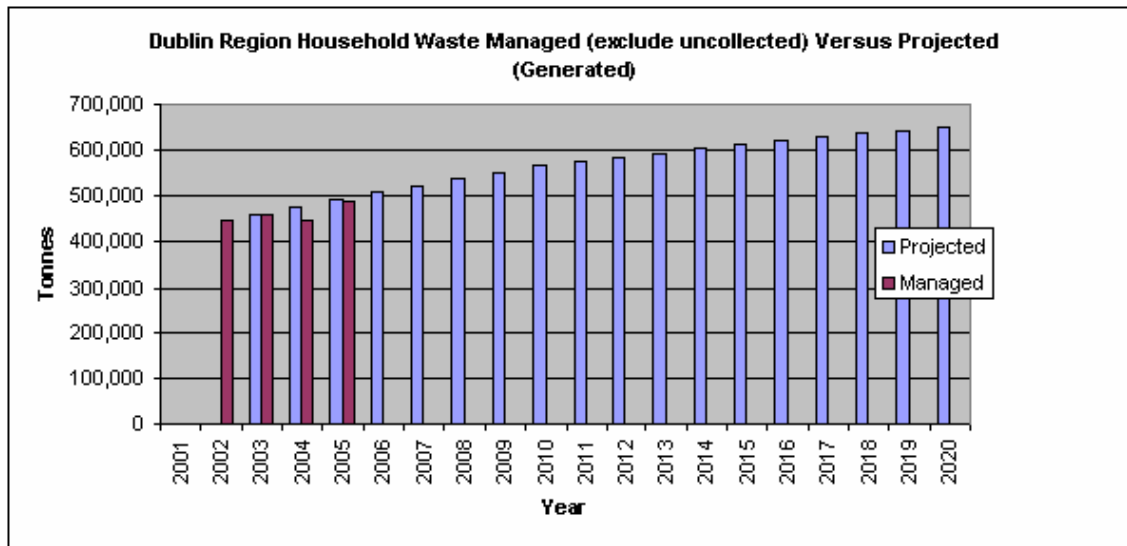


7. Future Waste Arisings.

The population and number of households in the Dublin Region respectively increased by 1.4% and 2.8% between 2002 and 2006. This is in line with the forecast used in the Dublin Waste Management Plan 2005-2010.

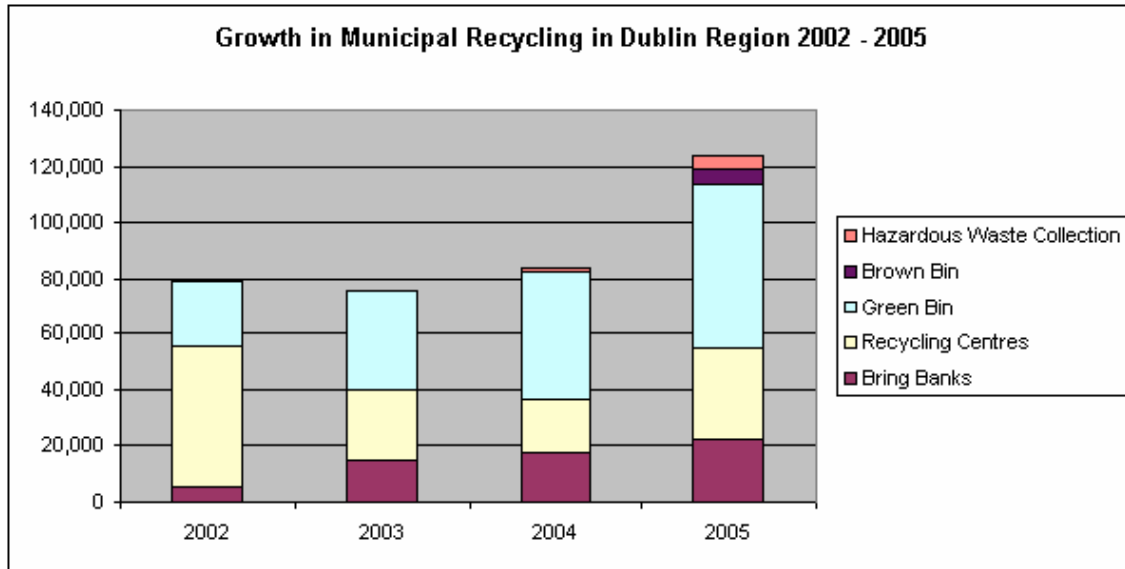
The quantity of household waste managed by the local authorities increased by 21,000 tonnes from 459,579 tonnes/annum in 2003 to 488,345 tonnes/annum in 2005 according to the EPA National Waste Report and local authority surveys. This increase is in line with the household waste arisings projected in the Plan. The decrease in 2004 can be explained by the temporary effect of the introduction of waste user charges.

Figure 3. (Source: Chapter 16 Dublin Waste Management Plan)



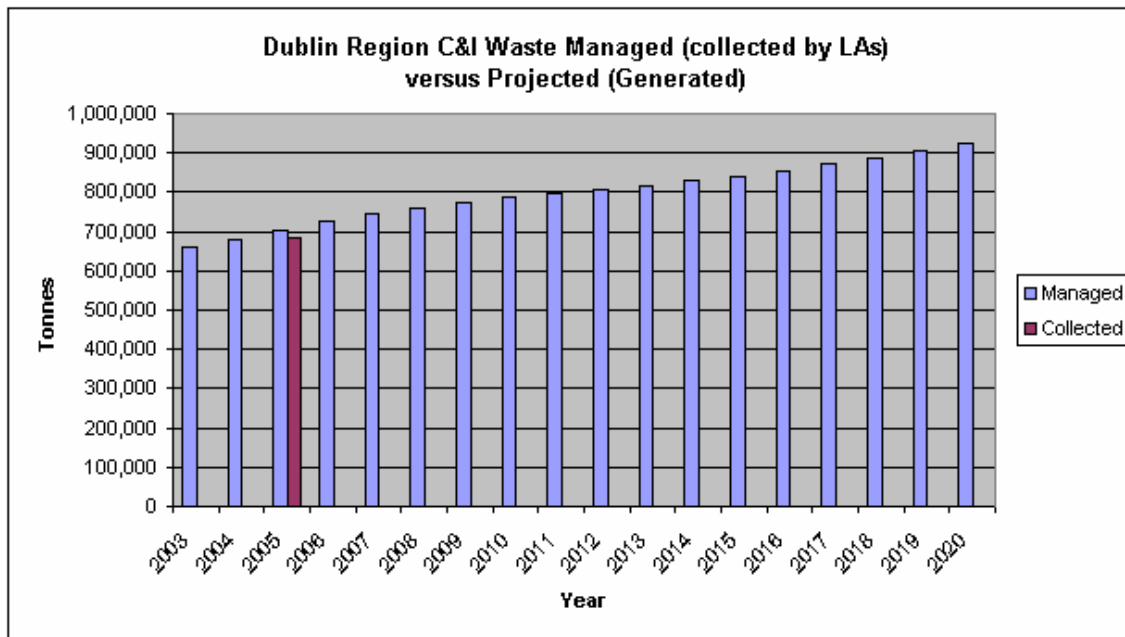
Meanwhile the recycling rate increased from 16% in 2003 to 26% in 2005 (Source: local authority questionnaires). Figure 4 below illustrates that the remarkable increase in recycling is principally due to the continued roll out of the green bin for source separated dry recycling. (Recycling Rate = Quantity Recycled / Quantity Collected as defined in the Dublin Waste Management Plan 2005-2010). The green bin is expected to increase further with the move to fortnightly rather than monthly collections and due to the introduction of plastic collections. In addition brown bin collections were only commencing in accordance with the Plan.

Figure 4 . (Source EPA National Waste Report 2007)



8. Commercial and Industrial Tonnages and Recycling Rates

Figure 5



685,430 tonnes of commercial waste managed were reported by local authorities to have been collected in 2005. This is likely to include some industrial waste as well, but not all.

It is likely that the 2005 C&I arisings will be similar or will exceed the arisings projected for 2005.

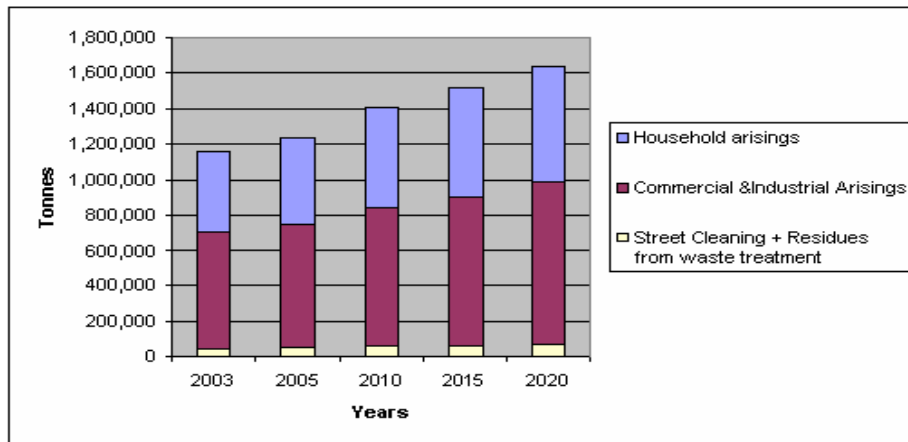
The recycling rates in the Dublin Region are 33% for commercial and 36% for industrial waste as reported in the Plan.

In addition to these C&I wastes, the following waste streams require or will require to be disposed of – street and litter waste (appr. 30,000 tpa – constant over the years), residues from biological and mechanical treatment of waste (estimated at 35,000 tonnes in 2020).

9. Total Household, Commercial and Industrial Waste Arisings

I summarise the combined effect of household, commercial and industrial waste arisings in the Dublin Region on Figure 6.

Figure 6. Households, Commercial & Industrial Waste Trends (Source RPS: updated from the waste plan projection.)



9. Treatment Capacity Required.

Table 1 overleaf shows the waste arisings from 2003 and waste projection for the period 2007 to 2020 with progressively increasing recycling levels to 47% of household waste and 49% of commercial / industrial waste. These figures are based on the projections in the Dublin Waste Management Plan 2005 to 2010. Table 1 consistently shows approximately 800,000 tonnes per annum available for residual treatment (incineration or landfill) after all the Regions commitments for recycling (including Ballymount, MRF and Ballyogan/Kilshane biological plants). Table 2 shows the available landfill capacity inside the Dublin Region and outside of it in terms of privately owned facilities together with a minimum quantity of 600,000 tonnes per annum going for incineration.

10. Comparison Residual Waste Arisings vs. Residual Treatment Capacity (WTE & Fingal Landfill).

Figure 7

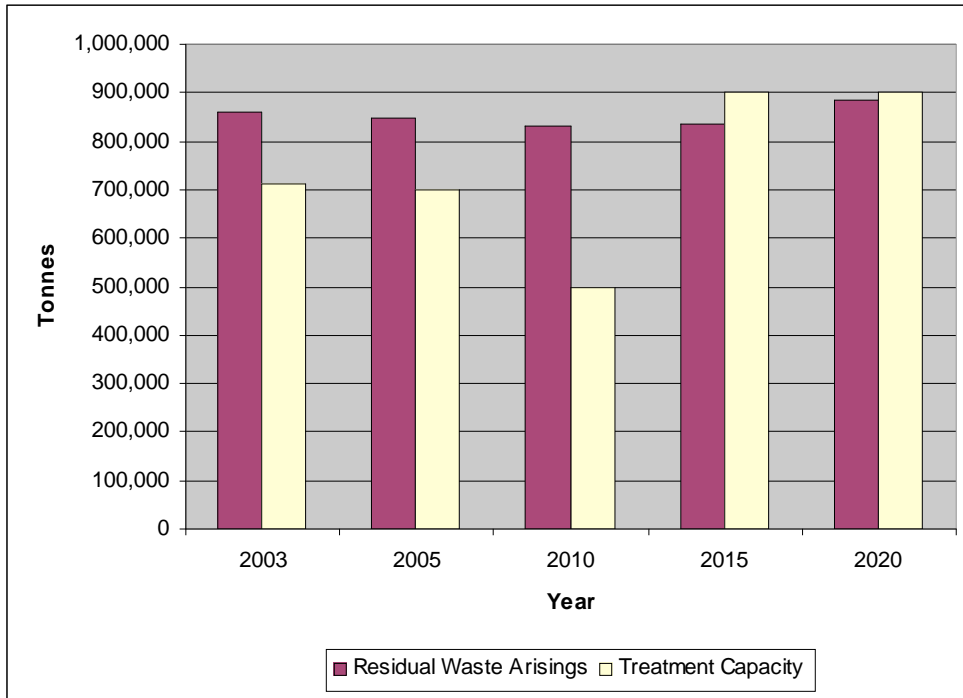
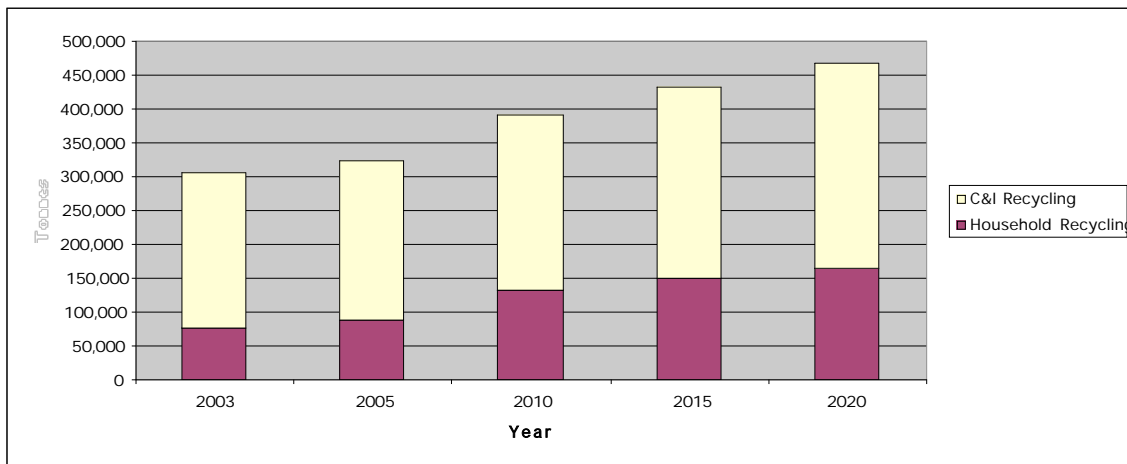


Figure 7 shows that there is a lack of treatment capacity in the Dublin Region until the WtE plant is commissioned in 2012. We can also see that from Figure 7 that even with the Fingal Landfill (operation starting in 2009) that significant residual waste arisings will have to be exported outside the region until the WTE start operating (2012). Initially there will be a slight overcapacity, but this will level off by 2020.

11. Trends in Recycling of Household, Commercial and Industrial Waste.

Figure 8



Recycling keeps increasing significantly even with the proposed WtE. This will be due mainly to the opening of the new Ballymount MRF (100,000 tpa), Ballyogan & Kilshane biological plants (90,000 tpa), an increase in number of recycling centres and bring banks.

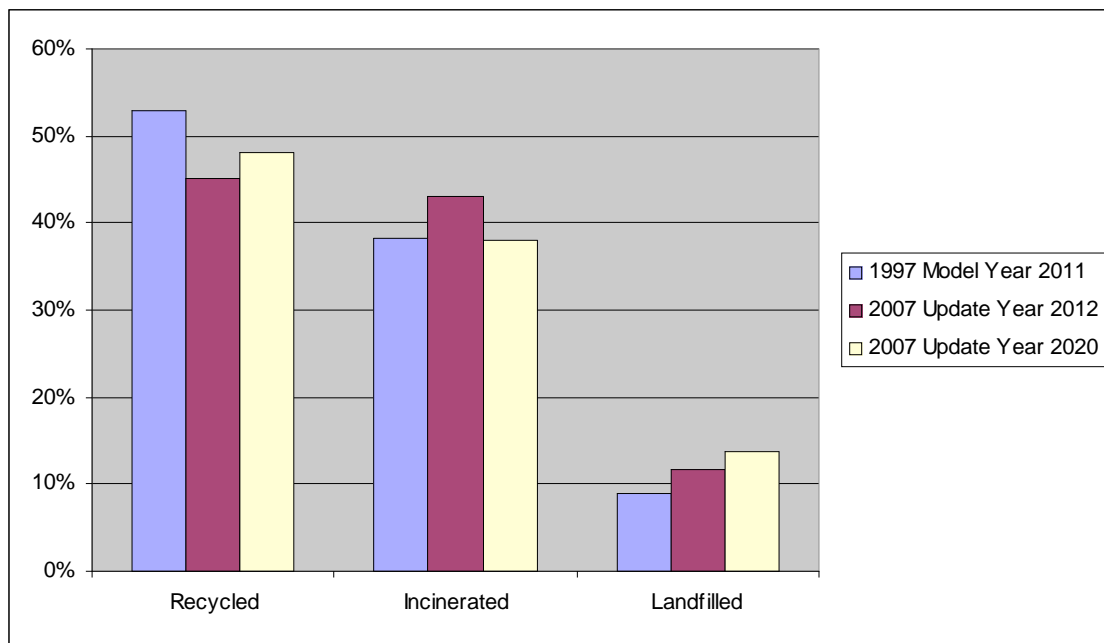
These calculations assume that Dublin wastes will be handled within the confines of the Dublin Region. They cater for 600,000 tonnes/annum for the Dublin WtE plant and some 300,000 tonnes/annum residual waste for the Fingal Landfill, for which a decision is pending from An Bord Pleanála on the application from Fingal County Council. We also need to plan some spare capacity in Dublin facilities to prevent lack of adequate capacity in the future which would drive up waste management costs, as happened in recent years. There may be unforeseen delays in providing recycling and biological infrastructure, therefore it is recommended that all future waste facilities be planned with some flexibility in terms of capacity.

12. Waste Plan Targets.

Finally we check that the foregoing allocations of waste to integrated facilities will conform to the recycling targets in the Dublin Waste Management Plan.

Figure 9 below shows the original plan year of 1997 compared with future years 2012 (when WtE commissioned) and 2020 in terms of recycling incineration and landfill. In particular the municipal waste recycling rate for Dublin will be 48% (excluding C&D waste) and therefore the introduction of incineration will not compromise recycling but will target the planned bulk reduction in landfill which the 1997 Waste Strategy directed local authorities to implement.

Figure 9



No account is taken of wastes generated outside of the Dublin region which are mentioned in their respective Waste Plans and which can be thermally treated.

Module 3 of 3

Site Selection Study

1. Background

The RPS/COWI team on the feasibility/siting project were:-

- RPS Consulting Engineers, Dublin
- COWI Consulting Engineers and Planners, Copenhagen
- Westforbraending WTE Plant, Copenhagen
- Professor A. Beenackers, University of Gronington, Netherlands
- Professor Judith Petts, University of Loughbrough and Birmingham, UK
- Landsdowne Market Research, Dublin
- Pat Delbridge Associates, Toronto, Canada
- Mary Murphy Associates, Dublin

2. Other Waste Siting Projects

A number of new landfill sites have been successfully chosen by RPS Consulting using the Draft EPA Manual of Site Selection. Most of these sites are now in successful operation including new (now private) landfill facilities at Ballinagran in Co. Wicklow and Knockharley in Co. Meath although the original siting studies were undertaken by me for Wicklow and Meath County Councils respectively. The same procedure was recently used with respect to the new regional landfill at Nevitt in North County Dublin. This latter project is awaiting An Bord Pleanála's decision following an oral hearing in autumn 2006. I have been responsible for each of these siting procedures, the strategic basis for which was an integrated waste management plan followed by a strategic siting process for the necessary facilities. The strategic siting process has over the years been greatly informed by advice from our partner consultants COWI of Denmark who have sited many waste management facilities including waste to energy plants. This process separated siting criteria into factors which had either "profound", "significant" or "material" effects on the outcome and logically excluded the profound while mitigating significant and material effects as far as possible.

In addition to our own experience in Ireland we had available to us the considerable international experience of COWI Consulting Engineers and Planners Copenhagen on waste to energy plants in Denmark. We also conducted visits to a broad range of plants in the UK, France, the Netherlands, Sweden, Austria, Germany, Spain and Italy where we witnessed at first hand the location and siting of plants operating satisfactory to EU standards.

3. Overall Siting Procedure

Regardless of the type of waste management facility in question, the overall siting procedure is the same in broad terms

- Formulation of Waste Management Plan for the county or region based on EC and National Waste Management Policy
- Examine a number of integrated management scenarios and through a comparative process conclude what the overall policy should be
- Establish the need for physical facilities, their number, type, siting criteria and required capacity

- Sieve out exclusionary areas based on the EU Precautionary Principle
- Examine “generally suitable areas” and deduce a “long list” of possible sites
- Examine the long list of sites using site selection criteria and general experience to deduce a short list of possible sites
- Carry out more detailed studies on the shortlist of sites and identified preferred site in order of merit
- Carry out more detailed studies on the preferred site having regard also to an outline of alternative sites as part of formal EIA and associated planning procedures
- Maximise public involvement throughout the process

4. Brief from Dublin City Council

An international competition for consultants to undertake a “*Feasibility study on thermal treatment of waste in the Dublin region*” was advertised in the European Journal by Dublin city council. Those requesting further information received “*Preliminary Briefing notes for Consultants*” which outlined how the city council on behalf of the four local authorities saw the study develop. The brief quoted the Dublin Waste Strategy Report to say that “*a thermal treatment facility is proposed with a capacity range 500,000- 700,000 tonnes/annum*”. The brief further called for “*a cost effective treatment system in the context of the Dublin Region, it will greatly increase the security of the waste management system and with energy recovery is favoured on environmental criteria compared with landfill disposal*”.

The brief stated that siting criteria which should apply include “*centre of gravity of waste, proximity to energy users (ideally users of heat), reasonable road access, appropriate development zoning and provision for disposal of cooling water*”. It continued “*the plant should avail of the Best Available Technology (BAT) having regard to ongoing development and improvement in these technologies which include incineration, gasification and pyrolysis*”.

It went on to emphasize that Thermal Treatment:-

- As a form of energy “ was higher than landfill in the EU waste Hierarchy”
- There was limited availability of landfill capacity in the region and a “high level of public resistance to new landfill development”
- The need to “deal with Dublin’s waste as far as possible within the confines of the Dublin region”
- The fact that “thermal treatment with energy recovery is a more desirable environmental system than landfill”
- It will “not compromise the meeting of waste recycling targets and will lower landfill requirements”.
- The requirements of EU Waste Directives on packaging and landfill are “unlikely to be achievable in practice without thermal treatment”
- The “economics of thermal treatment in the Dublin context are competitive with the alternatives of landfill”
- The “optimum location can maximise energy recovery including the use of heat for industry, potential use of heat in hear residential/commercial developments and electricity production.

The stated Project scope included:-

1. Waste streams, volumes and characteristics
2. Technological options (including BAT)
3. Environmental Impacts (ecology, water, air, public health, landscape, noise, transport, social and economic impacts, land use, heritage, residuals, accidental and sudden occurrences)
4. Life cycle analysis/ cost benefit analysis of most relevant concepts
5. End market Use (including energy and materials)
6. Siting
 - define objectives and criteria
 - define objectives most important to a preferred site i.e preferred or acceptable version exclusionary or unacceptable criteria in a rational and objective way
 - indentify list of possible sites
 - shortlist 1-3 sites by applying objectives, criteria and methods above.
7. Examination of representative facilities in other country
8. Procurement procedures
9. Public consultation and involvement
 - detail a programme for effective public concerns in the broad area of policy and strategy, operation and management, technical and economic and environmental impacts.

It was further stated that necessary qualifications for consulting firms were:-

- Relevant international experience in preparation of similar reports on the scale proposed in Dublin
- Ability to provide impartial and independent advice on all methods of thermal treatment and be “at arms length” from any particular process or technology
- Experience in EIS’s, pollution abatement, co-operation with regulatory authorities, environmental auditing, life cycle analysis and public consultation for environmentally sensitive projects
- Enterprise/experience in public sector capital project evaluation techniques

Selection of the successful firm(s) would be on the basis of technical merit and cost.

Applicants were asked to supply details of :

- Professional and technical capacity and competence of the firm
- Approach/ methodology used
- Criteria for siting, technology, environmental aspects and procurement.

Firms were shortlisted and interviewed by an independant board acting for Dublin City Council resulting in the appointment of MCOS/COWI together with a consortium of Dutch/Austrian/Danish/English/Canadian experts.

5. The most suitable site

When working for public and local authorities on a site selection process, because they have legal CPO powers they are expected to ensure that the best possible site is chosen from within the administrative area. The private sector however can pick a site without

due formality and then convince the planning and regulatory authorities that it is “suitable for its intended purpose”. It is also pertinent to note that a robust and appropriate site selection procedure is the ultimate mitigation measure to eliminate and/or minimise adverse impacts on the environment.

- The objectives of the siting study were therefore to:
- Minimise environmental impact
- Maximise acceptability of the project by the local community
- Minimise the cost of the development.

6. Siting Criteria, Legislation and Guidelines

There are no national guidelines in place for the siting of non-hazardous thermal treatment plants. There are however draft EPA Guidelines for the siting of landfills the broad outline of which create a framework which was followed, but having regard to key issues of relevance to waste to energy projects. For example, the underlying geology and hydrogeology is a key technical issue for landfill selection due to its geotechnical nature, whereas the reuse of available excess energy or heat is a key issue for waste to energy plants and not so with landfills.

In terms of legislation and guidelines, we used the Waste Management Act 1996 which suggests the EU waste hierarchy of reduction, reuse, recovery and finally landfill of residual wastes. There is however no specific guidance on siting other than the general requirement to manage waste to ensure that ‘environmental pollution’ does not occur. This is further defined to mean if a project “*to a significant extent endangers human health or harms the environment... in particular create a risk to waters, the atmosphere, land, soil, plants or animals; create a nuisance through noise, odours or litter; adversely affects the countryside or places of special interest*”.

It was therefore considered necessary to only consider areas of appropriate zoning in the City/County Development Plans and to exclude areas of special environmental designation on the basis that the best form of mitigation is in fact site selection.

In terms of ensuring that ‘environmental pollution’ would not occur, we also examined the then proposal for a Council Directive on the Incineration of Waste 1998 which stipulated the maximum emissions allowed during plant operation “*to ensure that waste is recovered or disposed of without endangering human health and without harming the environment*”. Operation of the plant to the prescribed emission limit values using appropriate technology which is tried and tested is the best guarantee of safeguarding human health and the environment.

7. Site Selection Procedure

A systematic selection procedure was adopted having regard to technical, environmental, social and economic criteria. This procedure was outlined in the Report on the Feasibility Study for Thermal Treatment of Waste for the Dublin Region in two

parts, the Report itself dated February 1999 but published in September 1999 and the Report on Siting and Environmental Issues dated November 1999.

The report issued in February and published in September 1999 discussed the available waste streams, the types of technology available on the market, the end market use of the energy products together with environmental and cost assessments, financing and procurement recommendations and recommended siting criteria.

The conclusions and recommendations of this report allowed for the possibility of more than one plant to be considered in the future. This was in the context of ongoing studies on alternative thermal treatment methods across Europe which was helping to inform the study in 1999 on best practice on how to proceed to implement the Regional plans on a National basis.

RPS Consulting was very much at the forefront of this public discussion on a national basis around Ireland as political difficulties started to adversely impact on the adoption of Regional plans in a number of counties. At that time, prior to the enactment of the Waste Management (Amendment) Act 2001, adoption of waste management plans was a political function. It is now an “executive function” of the City/County Manager.

I personally presented to Elected Members on this issue in various counties across the country and was acutely aware of “more politically palatable” alternatives to Waste to Energy being proposed. The main alternative to waste to energy current to the market at the time was Gasification which was being developed on a commercial scale for the first time at Karlsruhe in Germany. Subsequently another German system called Herhof was developed and also promoted by certain politicians as an alternative to incineration. More recently the alternative technology of Mechanical Biological Treatment (MBT) has also been proposed. Both of these processes are a type of Refuse Derived Fuel (RDF) considered at the time of the original Strategy in 1997 and further reviewed in 2006. I have discussed these alternative technologies earlier in my presentation.

In the September 1999 therefore a certain measure of flexibility was given in the recommendations that more than one plant might be constructed but that the first plant should be sited and constructed as quickly as possible on the preferred site. It is further stated that having one or two plants must however continue to remain options pending completion of the detailed Siting Study and EIS and indeed the procurement process of tendering where the technology and size of the plant still remains open until a successful service provider was confirmed.

The relative costs of different sized plants were discussed on pages 68 and 69 of the September 1999 Report. This report also recommended that Draft Siting Criteria be input into the public involvement process to include:

- Land Zoning
- Proximity to Source of Waste
- Traffic Considerations
- Potential for Exploiting the Energy Used
- End Market Use Possibilities for End Use
- General Planning and Environmental Consideration

It is further recommended that this report be placed in the Public Libraries and this subsequently was done in September 1999 prior to finalisation of the siting procedure.

8. Site Selection Methodology

In the Main Technical Report of the Dublin Strategy Report dated December 1997, which has been in the Public Libraries since early 1998, siting criteria for thermal treatment are included on page 148 as follows:

“Siting criteria which should apply include a central location close to the waste production center of gravity, proximity to energy users, ideally users of heat, reasonable road access, appropriate development zoning and availability of cooling water and provision for ash disposal.”

These criteria were carried forward as a starting point into the subsequent Feasibility Study for Thermal Treatment of Waste for the Dublin Region carried out in 1999 on the foot of the Feasibility Study recommendation in the Strategy Study.

As outlined in my introduction the overall siting procedure for all waste management facilities is broadly the same with initial formulation of policy in terms of various scenarios on a comparative basis concluding what the overall policy should be and the need for necessary infrastructural facilities to lead to a siting process for each of these.

In the case of the Dublin Waste Energy Project there were no national guidelines regarding the selection of areas suitable for the location of a non hazardous thermal treatment facility as such. However, the primary legislation did exist in terms of the Waste Management Act 1996, the EU Directive on Air Pollution from new Municipal Waste Incinerators (1989) and that then Proposal for Council Directive on the Incineration of Waste (1998). In addition, the Draft EPA Manual for Landfill Site Selection offered a general guide on the environmental approach to be taken. In addition, we were generally aware of World Health Organisation Guidelines and Basel Convention (United Nations Environment Programme – UNIP) for the siting of hazardous waste facilities, though these related to hazardous waste landfills in particular. We also had regard to the work of Professor Judith Petts then of University of Loughbrough, UK and a leading UK authority on environmental assessment of waste facilities including waste to energy projects. Professor Petts was a member of our Study Team along with Ms Pat Delbridge of PDA Consultants of Canada on stakeholder involvement.

Using the administrative boundary of the Dublin Region we commenced the siting procedure with a sieving process whereby exclusionary factors were first examined.

- Exclusionary Zonings from the City and County Development Plans
- Proposed Natural Heritage Areas
- Airport Exclusionary Areas
- Areas of High Amenity or Archaeological Interest

In taking account of the above exclusionary factors 10 areas were identified as potential sites. These sites were visited and a preliminary assessment carried out of their suitability for development to a waste to energy facility. The sites are listed by Local Authority below:

- **Dublin City Council**
 - A – the Poolbeg Peninsula
 - B – the former Semperit Factory at Killeen Road, Ballyfermot
- **Dun Laoghaire Rathdown County Council**
 - C – the Cherrywood Area at Loughlinstown
 - D – Agricultural Area at Glenamuck
 - E- the Tibbradden Section at Rockbrook
- **Fingal County Council**
 - F – Industrial Area West of Balbriggan
 - G – the Belcamp Area west of Malahide Road
 - H – Argiculturally Zoned Land at Deanstown
- **South Dublin City Council**
 - I – Vacant site at the Walkinstown Industrial Park
 - J – Vacant industrial site at Newlands

The sites were then subjected to a detailed assessment on the following criteria

- Road Access
- Traffic
- End Market Use
- Site Size and Current Land Use
- Proximity to Residential Areas
- General Planning and Environmental Considerations

The first four of these criteria are technically based and were identified in the earlier Feasibility Study for Thermal Treatment of Waste for the Dublin Region (February 1999) and more generally in the then adopted Waste Management Plan for the Dublin Region (1998/99). The latter two considerations were more particularly informed from the Public Engagement Process through market research, by Landsdowne Surveys.

9. Public Involvement Process

A critical issue during the Feasibility and Siting Study was the need for proactive public involvement in the process. For that reason, Dublin City Council on the recommendation of RPS commissioned Landsdowne Market Research to carry out a detailed survey of public opinion in the four Local Authority areas of the Dublin Region.

A two stage research approach was taken to engage the public in the process:

- Stage 1 was qualitative in design and consisted of 8 Discussion Groups, 2 in each of the Local Authority areas. The Groups reflected broad socio-economic sectors including full time employed, part time employed, housewives, retired, unemployed and students. The Groups were all representative of different ages from 20-65+, social classes and gender. The main purpose of this stage was to understand the public attitude and behaviour towards waste management in general, thermal treatment in particular and specifically siting criteria for a Waste to Energy Plant.
- On completion of stage 1 a questionnaire was designed, followed by a quantitative research. A total 506 interviews were conducted in the four Local Authority areas. A quota was set to reflect the demographic composition of each area and that was then weighed to reflect the total Dublin adult population.

In overall waste management terms, the research showed us that while only 25% of people felt “waste to energy” was a good idea in its own right that, there was a 72% approval of “waste to energy” as part of a integrated basket of measures to include waste prevention, recycling, composting, etc.

In terms of the criteria that people felt should be used for choosing a site, these were consistent views across all demographic and local authority areas and could be summarised as

- People considerations
- Environmental considerations
- Financial and Business considerations

In terms of people considerations overall people felt that the site should be located away from densely populated residential areas and areas frequented by school children. While the primary concern was the impact the emissions would have on people’s health, there was also concern that the plant would impact on the value of people’s property. There was concern among some that areas where people may hold less clout eg Council Areas may end up as “victims”. Transportation was also a consideration which should also include road safety features.

In terms of environmental considerations people felt that a good road network to the plant was a crucial issue, that particular consideration be given to noise and potential smell implications and that the plant should be in keeping with an industrial environment and blend in, i.e. in particular it was suggested that it might be located where other similar industries with stacks are located.

In business terms the cost of transporting waste was also felt to be an issue so that the plant should be located “within the centre of waste”. Also people felt that the energy created would have an economic importance and that it should be most easily connected into the National Grid or into other industries.

To summarise the siting criteria mentioned in the consultation by most people they identified industrial zoning, the location of existing waste sites and areas where industrial installations already exist as most suitable. It should be stated that these criteria don’t significantly differ from those internationally referenced. In finalising the site selection process, however these criteria would be deemed to be what are termed Group 2 criteria which would have “significant” impact if got wrong rather than Group 1 criteria with “profound” effects i.e. airports, Natural Heritage Areas, etc .

10. Shortlist of Sites

This synergy of “people” issues together with relevant “technical” issues created an overall framework from which then potential areas were assessed. Through this process the following most suitable sites for development of a waste to energy facility were obtained

- Cherrywood (Dun Laoghaire Rathdown County Council Area)
- Newlands (South Dublin County Council Area)
- Poolbeg (Dublin City Council Area)

- Robinhood (South Dublin County Council Area)

A detailed assessment of these sites is outlined in the Report on Siting and Environmental Issues dated November 1999 which also states their relative suitability in terms “more suitable” or “less suitable”.

11. Choice of Preferred Site

Consideration of alternative sites led to the conclusion in the Report on Siting that the Poolbeg Peninsula was the preferred site based on a suitable zoning, available land adjacent to the existing treatment works at Ringsend and strong potential for end market use of energy. The site was not in close proximity to residential areas, and new road development would make the area more accessible to every part of the region. This latter comment was in relation to the opening of the Dublin Port Tunnel which would make the area more accessible to the M50, with the future construction of the Macken street Bridge together with improvements on East Wall Road which would make traffic exiting from the Tunnel less inclined to access the East Link Bridge and come through Ringsend. In addition, what was then the long term prospect of the Eastern Relief Route would further improve the diversion of traffic from the M50 out of the Ringsend Area, though the lack of an interchange in Ringsend would not make this road scheme of any major strategic importance to the project.

In landscape terms, it is considered that the existing chimney scape from power stations in the port area would make the waste to energy facility visually less intrusive. Finally its location within the waste production centre of gravity for the region would support the proximity principle.

12. Conclusions Regarding Site Selection

Since the site selection process was commenced in 1999 a local office was set up by Dublin City Council in Ringsend jointly manned by a Senior Official of Dublin City Council and a Local Communications Co-ordinator employed by RPS. This latter proposal was to seek to achieve the ongoing objective sited on page 58 on the Report on Siting and Environmental Issues dated November 1999 as follows *“in order to achieve success with the siting of any waste facility it is important to involve the public in the process, engender their trust and convince those most affected by the proposal that it is the best solution to the problem”*.

Since 2000 a very substantial public involvement process has taken place by Dublin City Council to engage the people of Ringsend and Sandymount in further development of this sensitive proposal in their area. In particular for a 5 year period prior to the statutory planning process commencing in 2005 a very robust programme of information sessions, meetings of the Community Interest Group (CIG), regular newsletters, visits by International experts both for and against the project and an ongoing information resource library available to the local community with a Local Communications Co-ordinator on our staff.

Dublin City Council agreed to fund experts to provide advice to the CIG. Legal advice was obtained which confirmed that the siting procedure was sound. Professor Hank Van Der Kemp Head of Spatial Planning at Dublin Institute of Technology (DIT) provided expert planning advice, and concluded that the site selection process was valid. The

only reservation he expressed was whether the City and County Development Plans Zonings were an appropriate starting point for the Siting Procedure or whether “*all possible sites in the Dublin Region*” should have been considered. In my professional view, it was appropriate to exclude from consideration sites which were not suitably zoned for waste to energy. It would not be logical to consider land which was zoned for housing or public open space and amenities/parks, and would not be in line with best international practice of siting waste management facilities. Mr Bernard McHugh, Consultant Planner, is commenting in detail on the proper planning and sustainable development considerations for this project.

The Environmental Impact Statement contains an assessment of the site selection process including the alternative sites and concludes that, with the benefit of hindsight, the original siting is appropriate. In addition to the factors outlined in the siting study, other relevant factors include the development by Dublin City Council of its district heating proposals to service the Docklands area and the proximity of Dublin Port for the export of non-hazardous bottom ash and hazardous fly-ash for recycling abroad. The plant will also be capable of treating sewage sludge from the Ringsend Wastewater Treatment Plant which is currently recycled on tillage land in Leinster.

I summarise on the next page a matrix of the four short-listed sites with the various siting criteria used in 1999 and supplemented by additional considerations now that the technology and logistics of the chosen design are better known; i.e. the need for cooling and process water and use of the Port for export of ash. The principal change involving the Poolbeg site which is not in line with the siting study is the granting of planning permission for residential development within 1km of the recommended site. This can be looked on in a number of ways. The site will be much closer to residential development than assumed in the original siting study. Nevertheless, I am not concerned about this when compared to waste to energy plants in other capital cities already mentioned by Bernard McHugh, e.g. London, Vienna, Paris and Copenhagen. In fact, development pressure in itself indicates that we may have overreacted to the opinion surveys in 1999 in terms of perception of risk. Most members of the public now accept that this is a safe technology and not likely to adversely affect the value of adjacent properties. The recent sale of the Irish Glass Bottle site for substantial land values is further indication of this. Siting the plant away from residential areas was not an environmental, or Group 1 consideration.

Furthermore as outlined in Bernard McHugh’s submission, the subsequent draft Framework Plan and Docklands Masterplan for the Poolbeg peninsula prepared by various independent consultants all reserved the subject site as suitable for its recommended purpose i.e. as a thermal treatment site.

Arising from the foregoing with reference to the considerable body of studies carried out over the past 10 years in relation to our overall approach to how waste is managed in the Dublin Region, the options available, the technologies chosen and alternative sites I conclude that the subject site at Poolbeg for the Dublin Waste Energy Project was technically the best available site and in accordance with best international practice.