
10. POLICY DECISION MAKING CRITERIA

The formulation of the waste management policy for the Region is based on the following criteria, each of which received equal weighting:

1. Environmental assessment of recommended waste management scenarios
2. Ability to meet European and National waste management targets
3. Financial Cost

10.1. Environmental Assessment of Recommended Waste Management Scenarios

An environmental assessment was carried out to assess the relative environmental impacts of each of the waste management scenarios. This assessment follows broadly the methodology for a life cycle assessment (LCA) as laid down in ISO 14040. A full report on the life cycle assessment is included in Appendix 10.1.

The LCA study systematically addresses the environmental aspects of the systems from material acquisition to final disposal. In this case the product system is the waste management process. The goal of the study is to identify the environmental aspects of waste management scenarios under examination as part of the review of the waste management plan. The purpose of the assessment is to allow a critical comparison of waste management system scenarios' environmental performance to assist in the decision making process.

It should be noted that a life cycle assessment is an environmental management tool used to understand and compare the environmental burdens of an integrated waste management system. It does not represent a complete environmental assessment of any waste management system, technology or specific proposal. The assessment takes no account of site specific or regional risk factors. These will be taken account of during the statutory environmental impact assessment (EIA) and/or planning procedures prior to the implementation of specific facilities.

For this environmental assessment the system boundary for each scenario commenced at the waste collection point and finished when the waste was recycled, treated and/or deposited. The material is in the system once it was collected at the household or premises or from the civic amenity sites. The end point of the system was when the waste regains value as a raw material, product or when the material is disposed.

The emissions generated during the treatment and disposal of the waste were considered. Avoided emissions, for example, electricity generated by burning landfill gas or thermal treatment were also considered in this study. An environmental burden is defined as "energy and raw materials used and waste released to air, water and land". The model is based on the calculation of the relative environmental burdens associated with each of the waste management activities. The replacement of energy to the environment by electricity generation for example thermal treatment or burning landfill gas is taken into account as emission credits. The environmental burdens are classified into Environmental Impact Categories.

The selection of impact categories for the waste management assessment follows from the goal and scope of the assessment. The major environmental impact categories have been considered as well as toxicity impact potentials. In the assessment the emissions have been categorised into six environmental impact categories:

- acidification
- photochemical ozone creation
- eutrophication
- Human Toxicity Potential
- Ecological Toxicity Potential
- global climate change

Table 10.1: Summary of Environmental Performance Indicators used in Assessment^{xiv}

Environmental Effect	Expressed in Terms of	Environmental Performance Indicator Name	Reference Chemical
Human Toxicity Potential	Toxicity for humans resulting from dispersion in the environment	HTP Human Toxicity Potential	1,4-Dichlorobenzene (emission to atmosphere)
Ecological Toxicity Potential	Toxicity for the aquatic (freshwater) ecosystem resulting from dispersion in the environment	ETP Ecological Toxicity Potential	1,4-Dichlorobenzene (emission to water)
Global Climate Change	Heat-radiation absorption capacity	GWP Global Warming Potential	CO ₂
Photochemical Smog Creation	The change in ozone concentration due to a change in the emission concentration of a chemical	POCP Photochemical Ozone Creation Potential	Ethylene
Acidification	Acidifying effect on the ecosystem	AP Acidification Potential	SO ₂
Eutrophication	Contribution to the creation of aquatic biomass	EP Eutrophication Potential	Phosphate (released to water)

Source: VNCI, Guideline Environmental Performance Indicators for the Chemical Industry – The EPI – method Version 1.1, Table, Page 8.

These impact categories are explained more fully in the 'Data Analysis' section of the main LCA report. The data gathering philosophy for the study was to use data from published sources of data where possible. Estimation or calculation of emissions was avoided in favour of measured emissions. It is felt that this approach will reduce the scope for inaccuracy or error in the study.

10.1.1. Results of the Assessment

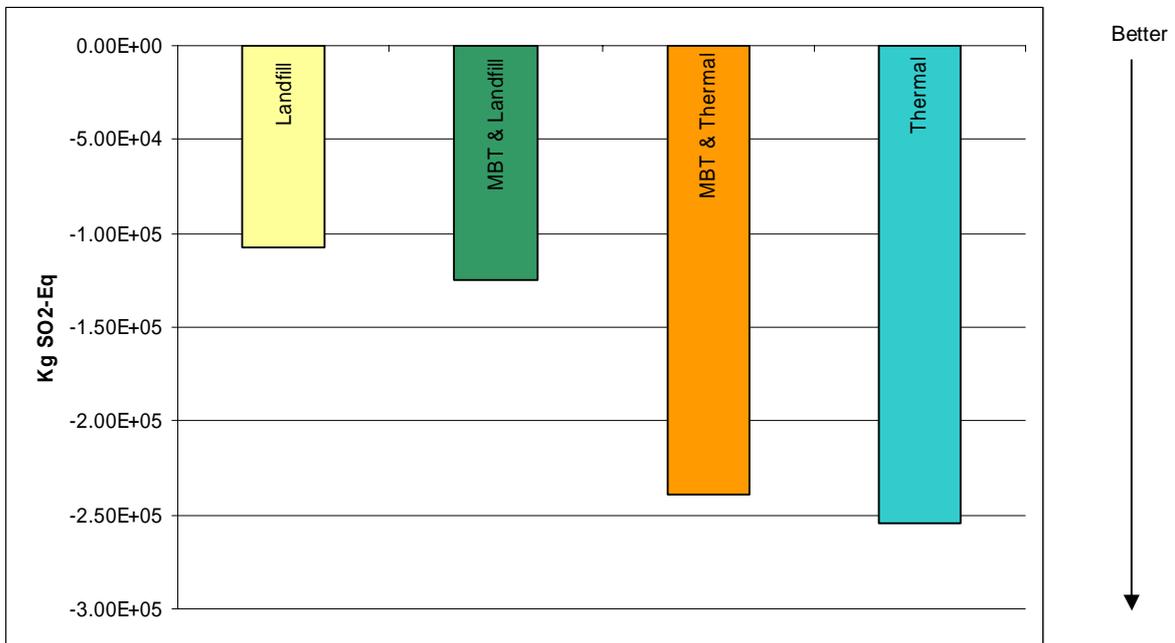
There is no waste management scenario that performs the best in all environmental impact categories. The interpretation of the results therefore requires consideration of the reasoning behind the results and the explanations why the scenarios perform as they do in each of the categories analysed. The results of the assessment are illustrated in Figures 10.1 – 10.6. In each of the diagrams, Scenarios 1 -3 represent the following:

- Scenario 1: Full recycling/recovery with residual to landfill only
- Scenario 2 (a): Full recycling/recovery with residual to a mechanical biological treatment (MBT) facility and thermal treatment
- Scenario 2 (b): Full recycling/recovery with residual to mechanical biological treatment (MBT) and landfill
- Scenario 3: Full recycling/recovery with residual to thermal treatment with energy recovery and residual to landfill

Acidification Potential

Acidification category results display a similar pattern to the POCP results. The acidification potential results as shown in Figure 10.1 show the least impact potential resulting from the thermal treatment options, with the pure thermal option coming out slightly better than MBT thermal treatment of the residual waste stream. The emissions avoided through the generation of electricity from the waste stream and the credits gained from recycling result in a negative value for all scenarios. The greatest savings are through the avoidance of electricity generation in traditional power plants.

Figure 10.1: Potential Impact on Acidification



Note: Kg SO₂-Eq is where sulphur dioxide (SO₂) is used as an indicator compound (Eq) for all other potential acidification compounds

Photochemical Ozone Creation Potential

The results of the analysis shown in Figure 10.2 show that the four scenarios have a 'credit' impact on the emission of potentially photochemical ozone (PDCP) creating substances. The recycled material that is recovered from each of the scenarios results in significant credits for the avoidance of emissions of POCP substances.

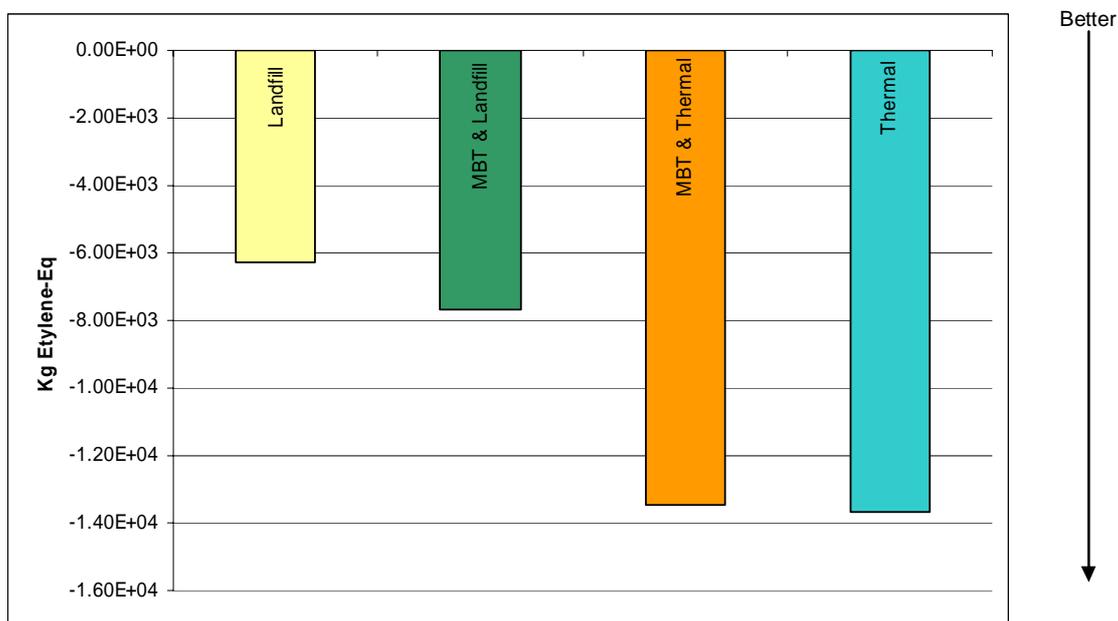
The scenarios which include thermal treatment also gain credit for the energy recovery from the waste and will result in further credits for these scenarios. There is also a small credit for avoided emissions associated with the energy generated from recovered landfill gas.

The results show that the scenarios with thermal treatment included as a waste option perform particularly well. This is due to the displacement of electricity generation emissions.

The thermal treatment of the residual is deemed to be the most environmentally advantageous option followed closely by the option of pre-treatment of waste in an MBT plant prior to submission to a thermal treatment. The treatment of the residual waste in a MBT prior to disposal to landfill is next after the thermal options with the scenario of sending residual waste direct to landfill fairing worst in terms of POCP.

It is noted that photochemical ozone creation potential category is not a highly important category in Ireland. Ireland has low concentrations of ground level ozone and photochemical smog is not a large problem in this country. However the category has been included as an interpretation category, in the main to allow comparison to other LCA studies.

Figure 10.2: Potential Impact for Ozone Creation

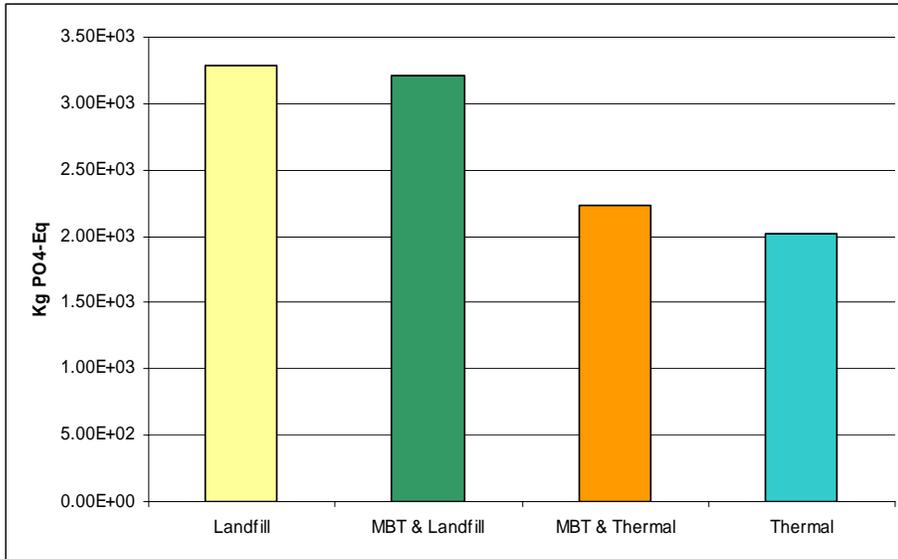


Note: Kg Ethylene-Eq is where Ethylene is used as an indicator compound (Eq) for all other potential ozone creating compounds

Eutrophication Potential

Eutrophication potential results from the emission of nutrients to natural waters is shown in Figure 10.3. The scenarios with high landfill volumes show the highest potential for eutrophication causing emissions. The options with thermal treatment fair better than the landfill options in the assessment. The thermal treatment performs best with the MBT pre-treatment prior to thermal treatment performing second best.

Figure 10.3: Potential Impact for Eutrophication



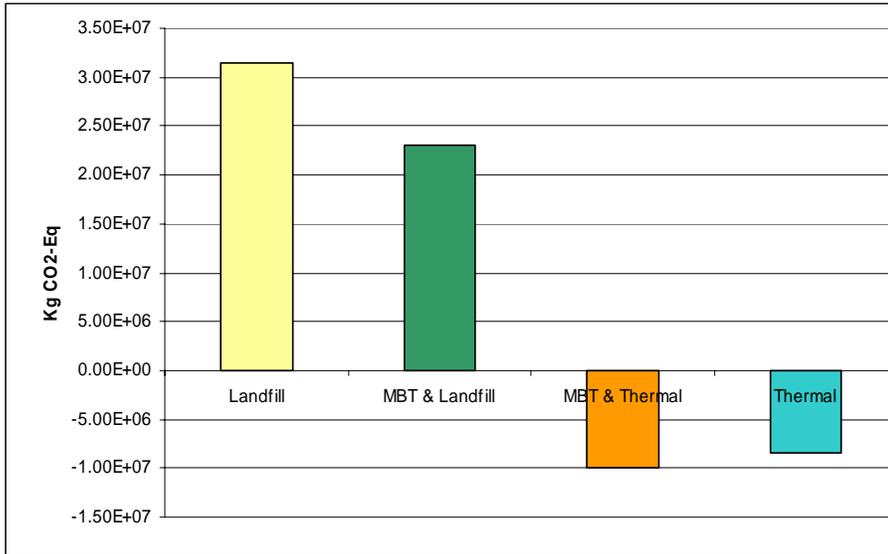
Note: Kg PO₄-Eq is where phosphorous is used as an indicator compound (Eq) for all other potential ozone creating compounds

Global Climate Change

The emission of global warming gases is greatest from the scenarios which depend heavily on landfill as a disposal option. As methane has a Global Warming Potential 21 times greater than carbon dioxide, waste management options that would result in a lowering of methane emissions, for example thermal treatment will have a lower impact on global warming. The results of the analysis are shown in Figure 10.4. Taking account of credits for recycling and from energy recovery, the thermal treatment options have the lowest potential for emission of global warming gases.

If there was greater energy recovery from the waste streams in the thermal treatment options – such as through the use of heat energy – this would increase the credits gained from avoided emissions for energy generation. Typically energy recovery with electricity only is in the order of 30 %, whereas with heat recovery this can increase to the region of 90 % energy recovery.

Figure 10.4: Potential for Global Warming

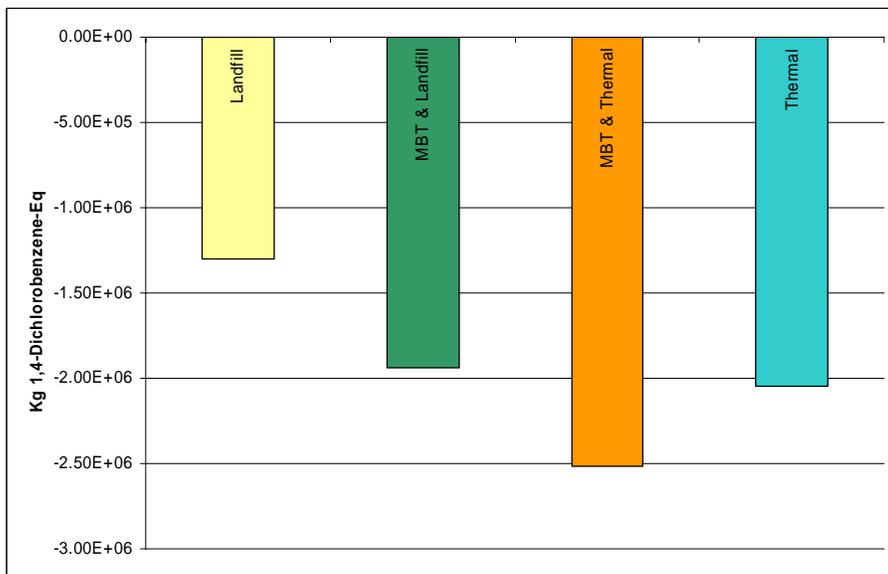


Note: Kg CO₂-Eq is where carbon dioxide (CO₂) is used as an indicator compound (Eq) for all other global warming compounds

Ecological Toxicity Potential

A review of the data shown in Figure 10.5 shows that waste management scenarios containing the thermal treatment option have the lowest ecological toxicity potential. Because the thermal treatment is strictly regulated and emissions tightly controlled, the emissions to air and water are minimised. Consequently the ecological toxicity potential is lower than the scenarios containing the landfilling option.

Figure 10.5: Potential Ecological Toxicity



Note: Kg 1,4-Dichlorobenzene-Eq is where 1,4-dichlorobenzene is used as an indicator compound (Eq) for all other potential ecologically toxic compounds

Human Toxicity Potential

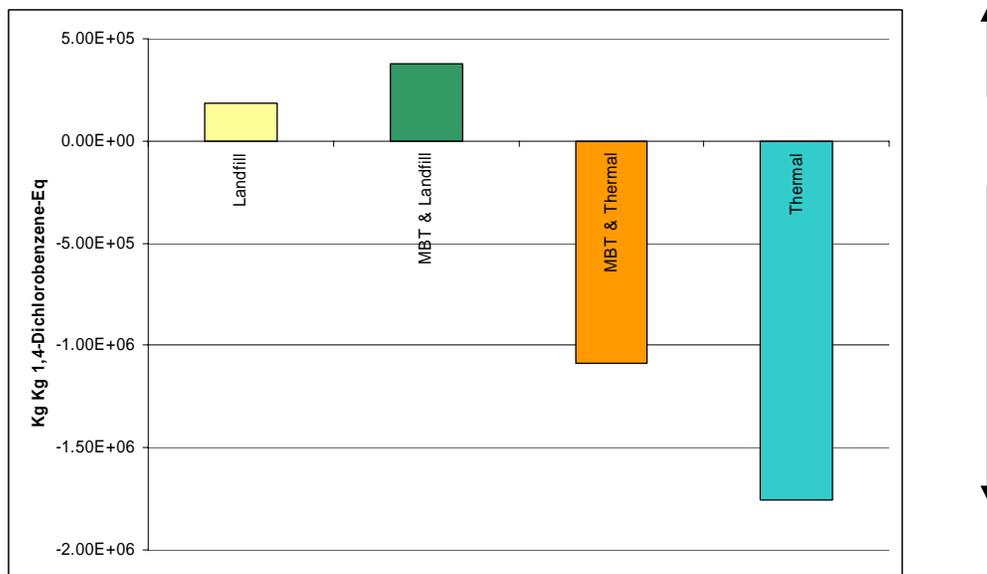
The waste management scenarios which depend on landfilling as a disposal option are shown in Figure 10.6 to have a greater human toxicity potential than a thermal treatment option. This is due to a combination of:

- strict environmental controls i.e. air scrubbing devices and filters, associated with a thermal treatment option
- strict European and National legislation on allowable emission levels
- avoided environmental burdens from the production of energy

The full recycling/recovery with residual to MBT and thermal with energy recovery scenario involves another stage of recycling and this has associated environmental burdens for example energy usage for MBT.

The landfilling and MBT scenario has a combination of environmental burdens associated with energy usage in MBT and long-term emissions from landfilling operations. While landfilling is 'credited' with avoided emissions for gas utilisation for energy production, the quantities produced would not be as great or as sustainable as from a thermal treatment plant.

Figure 10.6: Potential Human Toxicity



Note: Kg Kg 1,4-Dichlorobenzene-Eq is where 1,4-dichlorobenzene is used as an indicator compound (Eq) for all other potential ecologically toxic compounds

10.1.2. Conclusion

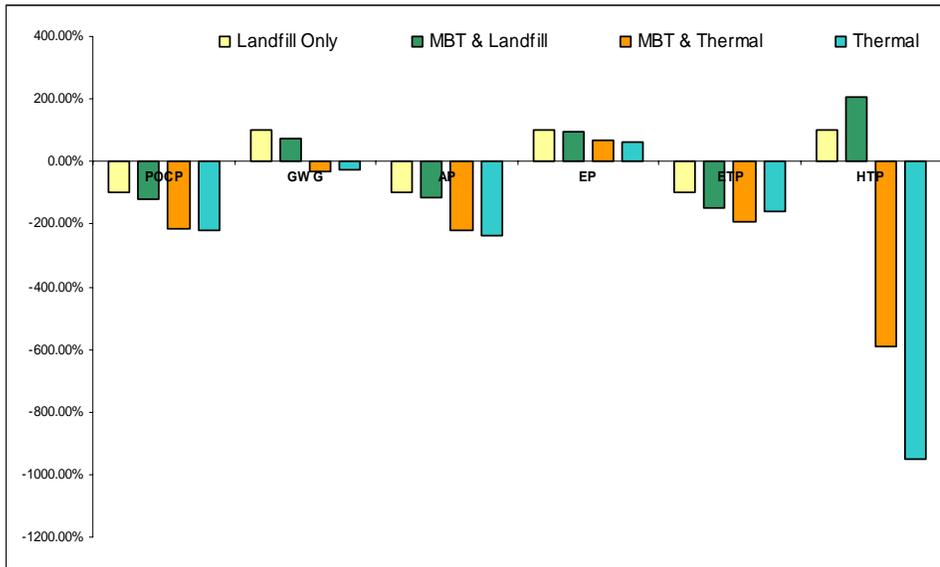
All four waste management scenarios have some form of recycling associated with them. The LCA shows that in the majority of cases, the recycling and electricity generation means that environmental burdens are avoided. Hence they are expressed on the charts as a negative flux value environmental impact potential. The environmental burdens associated with landfill and options containing landfilling have the greatest impact on global warming potential and eutrophication. This is a combination of the high global warming potential of methane (generated from the biological breakdown of organic matter in landfills) from landfills and leachate. While carbon dioxide (another greenhouse gas) emissions from thermal treatment options are elevated their impact is much less because of the lower global warming potential of carbon dioxide. In addition energy production from thermal treatment facilities reduces air pollutants emitted during energy production by other means.

When the environmental burdens associated with the different waste management scenarios is examined for local impacts, options containing thermal treatment are preferred. In all environmental impact categories examined, the thermal treatment options resulted in avoided environmental burdens.

The inclusion of transport emission data and the recycling targets sensitivity analysis performed did not alter the ranking of the options.

Scenario 3 - thermal treatment with ash and non combustibles to landfill is the preferred option from an environmental prospective. Accordingly, it should form part of the integrated waste management approach (operating to Best Available Technology) and it is envisaged that residual waste collected in the Region would be directed to such a thermal treatment solution in order to ensure the viability of this integrated waste management approach in accordance with the policy set out in section 11.5.

Figure 10.7: Summary of Relative Environmental Impact Potential



Ability to Meet European and National Waste Management Targets

Recycling is defined as recycling of materials obtained through the dry recyclable collection, the organic collection and the recyclable fraction obtained through mechanical and thermal treatment processes.

Materials recovery is defined as materials recovery which includes waste to energy and stabilised material going to co-combustion or waste to energy facilities after pre-treatment in a mechanical biological facility. Recovery also includes composting.

The residual that can not be recycled, recovered or thermally treated is landfilled.

The following table outlines the percentage of recycling, recovery and landfill for each of the scenarios.

For any scenario involving thermal treatment the recovery percentage is higher than the recycling percentage. This is because energy (heat) that is produced during the thermal process can be recovered. Waste that cannot be recycled or recovered can be thermally treated and therefore the percentage of residual waste (11 and 7% respectively for thermal or thermal and MBT) going to landfill is much lower than the landfill only and MBT and landfill scenarios (48 % and 32 % respectively).

Table 10.2 Recovery, Recycling and Disposal Indicators for each Scenario

	Landfill	Thermal	MBT & landfill	MBT & Thermal
Recovery	49%	85%	65%	89%
Recycling	49%	50%	54%	54%
Landfill	48%	11%	32%	7%
Disposal outside of county (hazardous fly ash)	0%	1.3%	0%	1.0%
Disposal outside of county (dross from recycling)	2%	2%	2%	2%

Notes The values shown above are based on the assumption that there is a 3-bin collection system and a biological treatment plant to treat separately collected biowaste. Some waste will be disposed of outside the Region, hazardous fly ash generated from thermal treatment has to be disposed of to a hazardous waste landfill and if any recycling takes place outside the region or country, the dross arising from that fraction will be managed there.

Materials for disposal are those residues, which are not recycled or recovered through mechanical biological treatment facilities and/or thermal facilities. These would include low quality stabilised compost from mechanical biological treatment systems.

Table 10.2 sets out in percentage terms the amount of landfilling, recycling and recovery that occurs with each scenario. The scenario of MBT with thermal treatment has the higher recycling and therefore overall recovery rate of 89%. This compares with 85% for thermal treatment. If bottom ash recycling was implemented in both scenario's, then overall recovery rates would be similar at approximately 94%, with corresponding reduction in landfilling. Additionally, approximately 24% recovery associated with MBT to thermal treatment in the short to medium term will occur outside of the state, with no notional benefit accruing from energy sales or bottom ash recycling. On balance, the environmental performance of both thermal treatment and MBT with thermal treatment as viewed as equivalent (for MBT facilities operating to a high standard), with thermal treatment higher ranked against lower efficiency MBT plants.

These scenarios are followed by MBT to landfill as third ranked, with landfill ranked fourth (landfill is also non compliant as can be seen from Table 10.3).

The following table sets out the primary targets for the diversion of biodegradable waste from landfill in the Landfill Directive and other national targets and degree of achievement. These diversion targets are based on waste arisings for the baseline year of 1995.

Table 10.3: Bio-Degradable Waste

Bio-degradable Waste	Landfill	MBT & Thermal	MBT & Landfill	Thermal
Target to divert 25% of biodegradable waste from landfill (2006)	×	✓✓	✓✓	✓✓
Target to divert 50% of biodegradable waste from landfill (2009)	×	✓✓	✓✓	✓✓
Target to divert 65% of biodegradable waste from landfill (2016)	×	✓✓	✓✓	✓✓
A diversion of 50% of overall household waste away from landfill (2013)	×	✓✓	✓	✓✓
35% recycling of municipal waste (2013)	✓	✓✓	✓✓	✓

- × Fails to meet targets
- ✓ Meets targets
- ✓✓ Exceeds Targets

It is clear from the tables that the landfill only option for residual wastes will not achieve compliance with the landfill directive and accordingly further treatment of the materials collected in the residual bin is required.

Solutions involving thermal treatment achieve (in relative terms) higher diversion from landfill and higher recovery target rates.

10.2. Financial Assessment

A financial assessment has been carried out on four (1, 2A, 2B, 3) waste management scenarios for the region. They have been carried out over a twenty-year period and include the operating and capital costs for the primary components of each scenario 2A, 2B and 3. For these scenarios they do not include for operators profits, risk or procurement and design costs and VAT. In relation to Scenario 1 (landfill only) a landfill gate fee of €85 per tonne has been assumed. This landfilling gate fee has been applied in the financial modelling of the other three scenarios where landfilling is involved. Total net present value costs for each scenario are presented along with net present value costs per NPV tonne for comparative purposes.

Capital and operating costs are based on the year 2006 and are indicative comparative figures for waste planning purposes. The model estimates an average NPC cost per tonne for various scenarios. This cost per tonne is used to compare different solutions along with a total net present value. It does not, however, reflect the anticipated final treatment costs which might arise for example under a Public Private Procurement scheme. The reasons for this are e.g.:

- The costs used are net costs. If contracted under a Design and Build contract the DB contractor will charge a fee to provide this service/take this risk. This fee could well be 10-20% of the overall CAPEX.

- Furthermore, if the plant is contracted through a DBFO type contract the DBFO contractor will normally add an additional fee to the DB contract price and the annual OPEX. These fees will depend on risk allocation and the competitive situation when bidding.
- The technical risk of Energy from Waste (EFW) is low and this is expected to reduce the risk premium for this type of facility vis-à-vis more untested ones.
- Financing mechanism is unknown.
- The facility is equipped with a turbine/generator with a view to exporting electricity from the plant. CHP is not assumed. Excess heat is cooled from the facility on site. If heat can be sold then treatment costs may be reduced.

A twenty-year planning period has been assumed covering the period 2006 - 2026.

The analysis is calculated using fixed costs assuming energy prices, operation and investment costs remain constant throughout the twenty year period.

The real interest rate has been fixed at 5% per annum and is assumed valid for financing investments.

Generated electrical power delivered from a waste facility to the public grid is considered to be a sustainable power source with a sales price of 4 cent per kW hour. No allowance has been made for green credits in the power sales price. Electrical supply power is typically in the range of 8 – 8.5 cent per kW hour.

Miscellaneous consumables used in areas such as thermal treatment plants and mechanical biological treatment facilities are included in the operational cost estimates.

The cost of dry materials recovery has been assessed at €83 per hour as a gate fee price, this is made up of capital and operational expenditure components, of €24/tonne and €67/tonne respectively. This price excludes Repak subsidies and the value of recyclables as these are subject to fluctuation. In the case of recyclables, they may have a positive or negative value. As a dry recyclable component of each scenario is similar this assumption does not impact on the financial assessment of the disposal routes under the four scenarios.

A landfill tax of €15 per tonne until the year 2006 is assumed rising to a maximum of €25 per tonne by the year 2008. Thereafter the landfill tax is assumed to remain stable at €25 per tonne. Increases beyond this figure will have a negative impact on scenarios with larger quantities for landfill disposal i.e. MBT to landfill scenario.

A comprehensive mechanical biological treatment plant is assumed, comprising mechanical separation followed by anaerobic digestion and aerobic stabilisation of the biological waste streams. For comparator purposes all stabilised outputs are either disposed of as Refuse Derived Fuel (RDF) to thermal facilities or disposed to landfill. It is recommended that in practice a facility may dispose of a combination of RDF and stabilised material. Other outputs, i.e. glass, aluminium, steel and plastics, are recovered for sale.

10.2.1. Waste Arisings

Reported waste arisings in the region are described in detail in Section 5. Projected waste arisings are discussed in section 8. The annual waste streams for the base year of 2004 and the target years of 2009 and 2016 are shown in Table 10.4 hereunder. These are the tonnages used in the financial and scenario models. The household waste tonnages are estimated for the baseline year, 2004 as, the number of households multiplied by a generation of 1.28 t per household. A collection from 80% of households was assumed. Commercial waste is assumed to arise at a 1:1 ratio to household waste in the South East Region (baseline year).

Table 10.4: Projected Waste Arisings for the Region

	2004	2009	2016
Household	156,550	180,847	200,058
Commercial/Industrial	141,279	155,320	175,440
Total	297,859	336,167	375,498

10.2.2. Financial Model for Assessment of Scenarios

The financial model calculates the operational and capital expenditure costs for the primary components of the waste scenarios as set out hereunder. The table illustrates the costs that were considered in the model.

Process Elements	Financial
Provision of bins at households	No
Provision of bins to non households	No
Collection at households	Yes
Collection at commercial/industrial waste producers	No
Transfer costs of dry recyclables, all sectors	Yes
Bring systems, including bring banks and civic amenity sites	Yes
Transfer stations	Yes
Home Composting	No
Bio-treatment	Yes
Dry materials recovery facilities	Yes
Mechanical biological treatment facilities	Yes
Thermal treatment	Yes
Landfilling	Yes
Landfill taxes	Yes

The investment and operational costs assumed for each process element are set out in Table 10.5. For the collection, recycling and recovery systems these are set out as a cost per tonne and are used to calculate the net present value of the core portion of the waste system, comprising collection, biological treatment and dry materials recovery. These elements of the waste collection system are the same for each of the four scenarios.

In relation to landfill, a gate price of €85 per tonne is assumed and in addition a landfill tax of €25 per tonne is assumed post 2008.

Table 10.5 Investment and Operational Costs for Waste Services

Item	Facility	CAPEX	OPEX	Other Costs/Income	Facility Size t/a
1	3 Bin Collection	-	€/t 164	--	
2	Civic Amenity	€/t 27	€/t 90	-	
3	Bring Site	€/t 22	€/t 160	-	
4	Dry Materials Recovery	€24	€/t 67	Transfer Cost €/t 8	30,000
5	Biotreatment	€/t 28	€50	-	16,000 t/a
6	Landfill	-	€85	€25 (Landfill Tax)	Market Gate Fee
7	MBT with Residue to Thermal	€69.4 m	€13.3 m	€3 m income	150,000 t/a
8	MBT with Residue to Landfill	€69.4 m	€14.0 m	€1.1 m	150,000 t/a
9	Thermal Treatment	€113 m	€8.7 m	€5.1 m	150,000 t/a

Within the overall waste collection system, all waste collection including treatment of recovered materials is covered by Items 1 to 5 and their costs are expressed in Euros per tonne. All costs are current in the First Quarter of 2006.

Landfilling for modelling purposes is expressed as gate fee per tonne of input tonne, landfill tax over the modelling period is assumed at €25/tonne.

For each of the three residual waste management systems the capital value is given in Column 3 and annual operational costs are given in Column 4, annual operational cost are nett cost with appropriate allowances for revenue streams.

10.2.3. Financial Evaluation

The financial evaluation is carried out for the management options for the residual bin separate to the collection, recycling and materials recovery elements as these are common to all scenarios. The distinguishing component between each scenario is a method of treatment for the residual waste fraction or "grey bin". The costs from the financial model for the core elements comprising collection, biological treatment and dry materials recovery are set out in Table 10.6.

The costs from the financial model for each of the four scenarios in terms of net present value for a twenty year horizon and net present value on a per tonne basis are set out in Table 10.7.

Table 10.6: Financial Evaluation (Core Cost – Nett Present Value (NPV))

	NPV (20 year)	NPV/tonne
	B€	€/t
Collection, Transfer, Bio-treatment and Materials Recovery	1.130	205

Table 10.7: Financial Evaluation (Residual Waste Disposal Cost – Nett Present Value (NPV))

	Scenario 1	Scenario 2A	Scenario 2B	Scenario 3
	Landfill	MBT to landfill	MBT to thermal treatment (outside country)	Thermal treatment
Net Present Value (20 year)	258 m€	296 m€	288 m€	215 m€
Net Present Value per tonne	110 €/t	126 €/t	123 €/t	92 €/t

In addition, a sensitivity analysis on the MBT options was also carried out. This comprised optimising the energy recovery from the anaerobic digestion plant, which achieves an approximately €5/tonne reduction in gate fees. Aerobic stabilisation only was also considered, producing a refuse derived fuel, which achieves an approximately €2/tonne reduction in gate fees. The most significant cost and highest risk item within the MBT scenarios is the disposal of stabilised material and soiled paper and caseboard. In the short to medium term, the market approach to this material is unlikely to change significantly and accordingly these materials attract a transportation/disposal charge or disposal charge respectively.

At present (2006), there are no RDF thermal treatment facilities or co-combustion facilities for RDF proposed in the Irish market. The disposal of RDF outside of Ireland, accordingly, attracts a transportation (shipping and handling) and disposal charge.

The financial calculations show that the thermal treatment option is the most cost effective. Further details of the financial calculations are contained in Appendix 9.1.

10.3. Summary

The outcome of the environmental, resource and financial assessments are set out in Table 10.8.

Table 10.8: Environmental, Resource and Financial Assessment Summary of each of the Scenarios (2011) (Ranking)

	Environmental Comparator		Resource Comparator	Financial Comparator Residual Waste Treatment
	Local	Global		
Scenario 1 landfill	4 th	4 th	Non Compliant	N/A
Scenario 2(a) MBT & Landfill	3 rd	3 rd	3 rd	3 rd
Scenario 2(b) MBT & Thermal	2 nd	2 nd	2 ^{nd*}	2 nd
Scenario 3 Thermal	1 st	1 st	1 ^{st**}	1 st

In summary, both thermal options show a greater performance over the two landfill options. Residual waste to landfill without pre-treatment will be non-compliant with EU targets after 2009. At the time of writing (March 2006, the DoEHLG on behalf of the state were seeking a derogation with respect to the landfill directive target years).

As noted in the financial comparator section a landfill disposal cost of €110 per tonne was utilised in the financial assessment of the three remaining scenarios. This landfill gate fee comprises a disposal charge of €85 per tonne and a landfill tax of €25 per tonne.

In terms of environmental and resource comparators thermal treatment and mechanical biological treatment followed by thermal treatment of residues is sensitive to the form of MBT facility provided, on balance taken into account the variety of technologies utilised within MBT, current issues with residue disposal versus the proven environmental and resource performance of thermal treatment that a thermal treatment is ranked first in these categories.

Finally the financial comparison shows a gate fee cost differential between mechanical and biological treatment with thermal treatment and the thermal treatment option of approximately 30%.

Accordingly Scenario 3 with thermal treatment of residual waste stream is the preferred option to form part of integrated waste management approach in the south east region.

* Some of the recycling and a significant percentage of the recovery will occur outside of the state.

** Recycling of bottom ash and recovery of heat in the future is not taken into account.

Accordingly Scenario 3 with thermal treatment of the residual waste stream is the preferred option to form part of an integrated waste management approach in the South East Region.