AGENDA

CABINET

MONDAY, 1 SEPTEMBER 2008

11.00 AM

COUNCIL CHAMBER, COUNCIL OFFICES, ST PETERS HILL, GRANTHAM NG31 6PZ

Duncan Kerr, Chief Executive

MEMBERS:	Councillor Mrs. Linda Neal (Leader/ Portfolio: Strategic Partnerships), Councillor Ray Auger (Portfolio: Access & Engagement), Councillor Paul Carpenter (Deputy Leader & Portfolio: Corporate Governance & Housing), Councillor Mrs Frances Cartwright (Portfolio: Economic Development), Councillor John Smith (Portfolio: Healthy Environment) and Councillor Mrs Maureen Spencer-Gregson O.B.E. (Portfolio: Resources & Assets)
Committee Support Officer:	Lucy Bonshor 01476 406120 e-mail: l.bonshor@southkesteven.gov.uk

Members of the public are entitled to attend the meeting of the Cabinet at which key decisions will be taken on the issues listed on the following pages. Key decisions are marked *.

1. APOLOGIES

2. MINUTES OF THE MEETING HELD ON 11 AUGUST 2008 (ATTACHED)

3. DECLARATIONS OF INTEREST (IF ANY)

CATEGORY A PRIORITY ISSUES:

4. *JOINT MUNICIPAL WASTE STRATEGY FOR LINCOLNSHIRE
Report number SS007 by the Healthy Environment Portfolio Holder.
(Attached)

[The Joint Municipal Waste Strategy and further supporting documentation referred to in report SS007 has not been circulated with this agenda in hard form due to the size of these papers.

Councillors may request a copy on CD Rom from the democracy services section. The documents are publicly available in electronic format from the Council's website: www.southkesteven.gov.uk Select the Local Democracy menu, then browse agendas/minutes, select Cabinet and then the date of the meeting 1 September 2008.]

5. MATTERS REFERRED TO CABINET BY THE COUNCIL, SCRUTINY COMMITTEE OR THE POLICY DEVELOPMENT GROUPS

6. ITEMS RAISED BY CABINET MEMBERS INCLUDING REPORTS ON KEY AND NON KEY DECISIONS TAKEN UNDER DELEGATED POWERS.

7. REPRESENTATIONS RECEIVED FROM MEMBERS OF THE PUBLIC ON MATTERS WITHIN THE FORWARD PLAN (IF ANY)

8. REPRESENTATIONS RECEIVED FROM NON CABINET MEMBERS

9. ANY OTHER BUSINESS WHICH THE CHAIRMAN, BY REASON OF SPECIAL CIRCUMSTANCES, DECIDES IS URGENT

MEETING OF THE CABINET
11 AUGUST 2008 - 11.08 AM – 12.08 PM

PRESENT:

Councillor Ray Auger
Councillor Mrs Frances Cartwright
Councillor John Smith
Councillor Mrs Maureen Spencer-Gregson O.B.E.

Councillor Mrs. Linda Neal - Chairman

Acting Chief Executive
Strategic Director
Acting Strategic Director
Corporate Head, Sustainable Communities
Interim Corporate Head, Financial Services
Interim Corporate Head, Healthy Environment
Monitoring Officer
Democracy Services Manager
Policy & Business Support Officer
Lead Profesional, Development Control

Non-Cabinet Members : Councillors Bob Adams ; Reg Lovelock M.B.E.

CO17. APOLOGIES

An apology for absence was received from Councillor Paul Carpenter due to his commitment on other council business.

CO18. MINUTES OF THE MEETING HELD ON 7TH JULY 2008.

The minutes of the Cabinet meeting held on 7 July 2008 were confirmed as a correct record.

CO19. DECLARATIONS OF INTEREST

No declarations of interest were made.

CO20. *MEDIUM TERM FINANCIAL PLAN 2008/09 - 2010/11

DECISION:

(1) To recommend to Council the approval of the revised medium term financial plan for the period of 2008/09 to 2010/11 as appended to report CHFR113;
(2) To note that an annual review of the plan will be undertaken to reflect the local and national economic climate and emerging issues;
(3) To note that following publication, an updated plan will need to take into consideration the findings of the newly revised housing revenue account business forecast model.

Considerations/Reasons for decision:

(1) Report number CHFR113 and appended documents prepared by the Interim Corporate Head of Finance explaining how the medium term financial plan (MTFP) brings together the Council's financial position and demonstrates how the revenue and capital financial resources are organised in order to deliver the council's priorities;
(2) The MTFP needs to be kept under constant review and updated annually to ensure it remains fit for purpose, taking into account current economic factors, spending pressures, the Government's efficiency target agenda, and the three year grant settlement;
(3) The long term financial planning of the housing revenue account will be undertaken to reflect both the updated HRA business plan and the outcome of the stock condition survey. Opportunities for securing the long term financial sustainablility of both the revenue and capital budget will need to be identified and incorporated into HRA service planning;
(4) Noting that, in relation to the cost of running the concessionary travel scheme, the county travel administrators have confirmed that the first quarter figures on take up will not be available until September and it will not be possible to use these as a basis to forecast where the Council's future position will lie as a) the first month will not be a sound indicator of future take up, and b) the

figures will need to be subject to sensitivity analysis.

Other options considered and assessed: None – the MTFP needs to be reviewed to ensure it remains fir for purpose.

CO21. *REVISION OF THE CAPITAL PROGRAMME

DECISION: To recommend to Council

(1) the approval of the revised housing capital programme as attached at appendix A to report CHFR112;
(2) the approval of the revised general fund programme as attached at appendix B to report CHFR112;
(3) the approval of the revised summary financial statement as attached at appendix C to report CHFR112.

Considerations/Reasons for decision:

(1) Report number CHFR112 and accompanying papers representing a complete review of the capital programme for 2008/09 and progress with its delivery. The housing capital programme for 2008/09 had been reviewed in the light of current and up coming contractual commitments for completing work on the Council's housing stock in the remaining part of 2008/09. The general fund had been reviewed to reflect slippage from the 2007/08 programme and new additional projects that had been scored by the capital assets and management group;
(2) A review of the capital programme is necessary to both ensure good financial planning and an up to date document which fully reflects the Council's spending programme;
(3) The capital programme has been amended to take account of the outturn position for 2007/08 and the current officer and contractor capacity to deliver the programme by the end of the financial year.

Other options considered and assessed: None – the review is necessary to ensure good financial planning.

CO22. *AWARD OF DRY RECYCLABLES CONTRACT

DECISION: To award the contract for the processing of dry recyclable materials collected by the Council's kerbside collection activities to Mid UK Recycling Limited for the initial term of three years from the date of the commencement of the contract with potential to extend the term for a further two years.

Considerations/Reasons for decision:

(1) Report number S006 by the Policy & Business Support Officer on

behalf of the Healthy Environment portfolio holder detailing the outcome of the tendering and evaluation process;

(2) Noting the current arrangements for dry recyclable material. To ensure the Council continues to offer the best service possible for its customers, the contract was subject to competitive tender. The tender process ensures that the service is as advantageous to the customer in terms of the range of materials collected for recycling, and that it is at the lowest possible costs;

(3) A competitive tender process ensures that the Council is legally compliant with current procurement regulations and achieves the most economically advantageous option for the authority;

(4) There is sufficient budget within the financial year to support the award of the contract to the recommended contractor.

Other options considered and assessed: All four tenders submitted were subject to a comprehensive evaluation in accordance with the specification providing sufficient linkage between the weightings in the tender assessment and the information requested in the tender documentation. Tender 2 submitted by Mid UK Recycling Limited offered the most economically advantageous option to the Council.

CO23. *LOCAL LIST OF INFORMATION FOR SUBMISSION WITH APPLICATIONS UNDER THE PLANNING ACTS

DECISION: The Cabinet recommends to Council:

(1) the adoption of the local list of information to be submitted with an application under the Planning Acts as appended to report PLA713;

(2) that delegated authority be granted to the Corporate Head of Sustainable Communities to correct any typographical errors, amplifications or amendments within the local list, but not to add any additional items to it.

Considerations/Reasons for decision:

(1) Report number PLA713 by the Development Control Service manager and Lead Professional on behalf of the Economic portfolio holder concerning new statutory requirements introduced on 6 April 2008 for plans and information to accompany a planning application. The new legislation sets out for the first time the exact information required to support a planning application. If the required information is not submitted, the application is invalid. The information is divided into two lists; the national list which sets out the mandatory requirements for all applications and a local list that sets out optional information that a local planning authority can request to support an application;

(2) The overall content of the local list is at the discretion of the

local planning authority. The proposed local list for South kesteven, as appended to report PLA713, is of no legal effect until it is formally adopted by the Council and published on the Council's website;

(3) Consultation on the proposed local list is recommended but not a legal requirement; consultation has taken place via the Council's new local planning agents' forum who raised no objection to the proposed local list. Officer advice on undertaking wider consultation is that it would engender little response and it is probable that very little or no change would be made to the list as a result.

Other options considered and assessed: None – if a local list is not adopted, the statutory requirements of the national list would prevail. The local list will provide clarity to developers, enhance the consultation process and contribute to the sustained performance of Development Control.

DATE DECISIONS ARE EFFECTIVE:

Minutes CO20, CO21, and CO23 are policy framework proposals and therefore stand referred to the full Council for approval on 4 September 2008. Minute CO22 is a key decision reserved to the Cabinet and can be implemented on 20 August 2008 subject to the decision not having been called in.

South Kesteven District Council, Council Offices, St. Peter's Hill, Grantham, Lincolnshire NG31 6PZ

Contact: Cabinet Support Officer - Tel:
e-mail: @southkesteven.gov.uk

REPORT TO CABINET

REPORT OF: CABINET PORTFOLIO HOLDER HEALTHY ENVIRONMENT

REPORT NO.: SS07

DATE: 1 September 2008

TITLE:	Joint Municipal Waste Strategy for Lincolnshire
FORWARD PLAN ITEM:	Yes
DATE WHEN FIRST APPEARED IN FORWARD PLAN:	16 April 2008
KEY DECISION OR POLICY FRAMEWORK PROPOSAL:	Key Decision

COUNCIL AIMS/ PORTFOLIO HOLDER NAME AND DESIGNATION:	John Smith –Portfolio Holder Healthy Environment	
CORPORATE PRIORITY:	Recycling	
CRIME AND DISORDER IMPLICATIONS:	None	
FREEDOM OF INFORMATION ACT IMPLICATIONS:	This report is publicly available via the Local Democracy link on the Council's website: www.southkesteven.gov.uk	
INITIAL EQUALITY IMPACT ASSESSMENT	**Carried out and appended to report?** **Carried out by Lincolnshire County Council**	**Full impact assessment required?** **No**
BACKGROUND PAPERS:	WCS26 – 3 March 2008	

1. INTRODUCTION

The Lincolnshire Waste Partnership (which comprises Lincolnshire County Council, the seven District/Borough Councils and the Environment Agency) has been consulting on a draft Joint Municipal Waste Management Strategy (JMWMS) to replace the 2002 strategy.

A report on the detail of an earlier draft of the strategy document was considered in March 2008 and comments forwarded to Lincolnshire County Council[1.]

2. RECOMMENDATION

The Joint Municipal Waste Management Strategy be adopted.

3. DETAILS OF REPORT

The resulting strategy takes into account national waste management targets and sets out ten objectives which will provide a clear focus for the partnership agencies. (This document is available electronically via the Council's website: www.southkesteven.gov.uk select Local Democracy menu/browse the agenda/ minutes/ Cabinet/meeting for 1 September 2008)

Objective 1	To prevent the growth in municipal waste by promoting waste reduction and re-use initiatives to ensure that no more than 225Kg of residual household waste per person per year is produced by 2020.
Objective 2	To promote waste awareness through co-ordinated public education and awareness campaigns and effective community engagement.
Objective 3	Across Lincolnshire to achieve 55% recycling and composting by 2015.
Objective 4	Across Lincolnshire to achieve a uniform dry recyclable waste stream by 2013.
Objective 5	To increase, progressively, the recovery and diversion of biodegradable waste from landfill, to meet and exceed the Landfill Directive diversion targets.
Objective 6	To ensure that residual waste treatment supports energy recovery and other practices higher up the waste hierarchy.
Objective 7	To deliver best value for money waste management services, addressed on a county wide basis.
Objective 8	To engage with local businesses to encourage the reduction and recycling of commercial waste.
Objective 9	To engage actively, lobby and work with local, national, governmental and other organisations on sustainable waste management issues.
Objective 10	As Local Authorities to set an example by preventing, reusing, recycling and composting our own waste and using our buying power to encourage positively sustainable resource use.

Objective 3

The recycling rate across the County for 2006/7 was 40% and predicted to be 51% for 2007/8. Provisional performance data on recycling/composting across Lincolnshire during 2007/8 is detailed in the table below:

	%age waste sent to landfill	%age recycled	%age composted	Waste collected kg/head
Boston	70.9	27.7	1.4	408.3
East Lindsey	41.8	26.4	31.8	420.2
City of Lincoln	55.0	25.2	19.8	429.9
North Kesteven	42.8	29.3	27.9	457.1
South Holland	69.3	30.6	0.2	378.4
West Lindsey	62.5	22.2	15.4	427.7
South Kesteven	**48.7**	**35.4**	**15.9**	**392.8**

The above data is currently provisional however there are unlikely to be significant changes. These results demonstrate that South Kesteven's waste collection policy is diverting the highest proportion of dry recyclable material from landfill in Lincolnshire. South Kesteven recycled and composted 51.3% of waste against a 50% target.

The target for 2008/9 is 55% and quarter 1 data indicates that Council is on track to achieve this level of performance. Recent expansion of the green waste service will increase the overall diversion rate still further.

The combined target set out in Objective 3 of the strategy cannot be achieved by the higher performing authorities continuing to divert even more waste from landfill. Lower performing authorities within the partnership may need to consider significant investment in alternative collection arrangements in order to meet this shared objective.

Following adoption of the JMWMS a joint action plan will be developed to identify how this target will be met across the partner authorities.

Objective 5

The Landfill Directive requires that the amount of biodegradable municipal waste disposed of in landfill is significantly reduced in coming years, to 75% of 1995 levels by 2010, 50% of 1995 levels by 2013 and to 33% by 2020. Whilst it is likely that the 2010 target will be met by current practice (as recycling and composting increases) to achieve the later targets will require the procurement of alternative disposal facilities for residual waste. The JMWMS identifies Energy from Waste with Combined Heat and Power (EfW) as the preferred solution for the treatment of residual waste. A planning application for a facility in North Hykeham is to be submitted in autumn 2008.

The County Council has submitted a bid to DEFRA for Private Finance Initiative (PFI) funding for the EfW plant, and as part of this process DEFRA insist that a JMWMS is in place. Recent legal opinion taken by the County Council indicates that all the local authorities in the Lincolnshire Waste Partnership are required to

formally adopt the JMWMS in order for it to be valid for this purpose. The timetable for procurement of the EfW is extremely tight and the JMWMS needs to be adopted by the end of September 2008 in order that no further delays to the timescale are incurred.

5. COMMENTS OF SECTION 151 OFFICER

It is not clear in the report whether there may be any potential financial implications for the Council arising from the adoption of this strategy but the financial planning process in respect of the service will need to take full recognition of the Council's role within the partnership. Further clarification is needed whether the funding application in respect of the EfW plant will require any match funding from the Lincolnshire Waste Partnership. If this is the case then sufficient budget provision will need to be made available.

6. COMMENTS OF MONITORING OFFICER

It is a statutory requirement, as provided by the Waste and Emissions Act 2003 that waste authorities have a joint strategy for the management of waste. Consequently, the strategy must be adopted in order for this Council to comply with its statutory obligation.

7. CONCLUSION/SUMMARY

District Councils and the County Council have a legal obligation to have a joint strategy in place for the management of municipal waste. Whilst this document does not legally bind the Council to its targets it does set a clear direction for future joint working initiatives and arrangements. Adoption of the JMWMS by all of the authorities in Lincolnshire is a critical step in enabling Lincolnshire County Council to be successful in bidding for PFI credits in the procurement of the energy from waste plant. This Strategy has been subject to extensive consultation with partners, other agencies and the wider Lincolnshire community via road shows and the internet.

8. CONTACT OFFICER

Tracey Blackwell
Acting Strategic Director
t.blackwell@southkesteven.gov.uk

[1] – WCS26 3 March 2008

Joint Municipal Waste Management Strategy

for Lincolnshire

The Lincolnshire Waste Partnership
June 2008

Boston Borough Council
East Lindsey District Council
Environment Agency
City of Lincoln Council
Lincolnshire County Council
districtnk
South Kesteven District Council
South Holland District Council
West Lindsey

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1 Vision

This Joint Municipal Waste Management Strategy (JMWMS) for Lincolnshire provides a method by which the eight local authorities of Lincolnshire and the Environment Agency can work in Partnership to deliver sustainable waste management services to the community, as well as to commercial and industrial customers, and establish best value waste management practices.

The Lincolnshire Waste Partnership vision is:

- To commit to sustainable development and the waste hierarchy
- To minimise waste growth by encouraging and promoting waste prevention and reduction
- To promote sustainable resource use through increased re-use, recycling and composting of waste
- To maximise recovery and the use of waste as a resource
- To reduce the amount of biodegradable waste sent to landfill each year
- To minimise the impacts of final disposal

2 Introduction

2.1 Background

A partnership has been established between the public bodies within Lincolnshire responsible for collection and disposal of waste. The purpose of the partnership is to:

- Continuously improve the quality of service provided to the community
- Establish best value waste management for the public across Lincolnshire
- Meet landfill diversion targets

The Lincolnshire Waste Partnership (the Partnership) operates within a framework of joint working, agreement and partnership. Each Local Authority in the Partnership is represented by an officer and member with executive authority to take decisions on behalf of his/her Local Authority in relation to matters to be considered by the Partnership.

This Joint Municipal Waste Management Strategy provides a structure that will enable the eight partnering local authorities of Lincolnshire (Boston Borough Council, City of Lincoln Council, East Lindsey District Council, Lincolnshire County Council, North Kesteven District Council, South Holland District Council, South Kesteven District Council and West Lindsey District Council) and the Environment Agency to manage the municipal waste produced in the County effectively.

While waste management performance in the County is improving, this waste strategy has been developed to set a framework within which the Partnership can continually improve the waste management services offered, minimise costs and meet challenging recycling and landfill diversion targets.

The aim of the waste strategy is to provide information on the following:

- The current and future legal obligations that the Partnership will need to meet
- The waste management services that are currently provided
- How the Partnership plans to meet the targets by reducing the amount of waste that is produced, increasing the amount of waste that is recycled and recovered, and minimising the amount of residual waste that is landfilled
- How the Partnership plans to implement this strategy.

The Environmental Assessment of Plans and Programmes Regulations 2004 introduced a requirement for a Strategic Environmental Assessment (SEA) to be produced for a number of statutory documents including Municipal Waste Management Strategies (MWMS). As the Partnership is revising its Joint Waste Strategy there is a statutory requirement to undertake an SEA on this document. Consequently, in accordance with Government guidance, the SEA process, including the preparation of an Environmental Report, has been conducted at the same time as developing the Joint Municipal Waste Management Strategy (JMWMS). This ensures that implementation of the JMWMS, through long-term procurement of waste management infrastructure, will be supported by the SEA.

The role of the SEA is to complete a thorough environmental assessment of a number of scenarios, considering a number of waste treatment technologies which can deliver the objectives set by the strategy. The initial consultation on the development of the new waste strategy has been conducted with a range of stakeholders as part of the scoping stage process for conducting the SEA on the draft waste strategy.

As part of the SEA and the strategy development process there is a requirement to conduct a public consultation. The Partnership made the draft strategy and the Environmental Report (which presents the outcomes of the SEA) available to the public for consultation from 21 December 2007 to 7 March 2008. The outcomes of the consultation exercise have been incorporated, together with the findings of the technical evaluation, into the final version of the strategy and the Environmental Report. .

It is important to note that while new legislation will require improvements from other sectors in the management of all waste streams, the Partnership is currently only responsible for managing municipal waste. The plans for any new recycling facilities and residual treatment facilities described in this strategy will only cover this waste stream.

2.2 Scope and context

Lincolnshire's original Waste Strategy (April 2002) highlighted the challenges and drivers facing local authorities in the management of waste, and included reference to the following:

- The need for more waste to be recycled, composted or (in the longer term) used in energy recovery schemes as a result of various EU and Government initiatives, policies and targets
- The fact that municipal solid waste (MSW) arisings are growing steadily
- The fact that the costs of dealing with each tonne of waste are increasing

Most of these drivers were a result of the Government's Waste Strategy 2000[1], which sets a national framework for waste management and introduced statutory recycling and composting targets for local authorities.

More recently the Government published Waste Strategy 2007 which provided a greater emphasis on tackling waste growth, improving recycling/composting and diverting substantial quantities of biodegradable waste away from landfill. To enable the implementation of this national Waste Strategy, the Government introduced key policies and regulations primarily focused around the use of the following economic instruments:

- **Landfill Tax** - Landfill tax is paid for each tonne of waste disposed of at landfill sites. Landfill tax will increase by at least £8 per tonne each year until the tax reaches £48 per tonne by 2010/11. The landfill tax is currently £32 per tonne, rising to £40 per tonne in 2009/2010. This means the increase in landfill tax will cause a significant increase in overall waste disposal costs for as long as landfilling is used as the principal method of disposal. On the other hand it will simultaneously provide a considerable incentive to move to alternative and more sustainable means of waste disposal.
- **Landfill Allowance Trading Scheme (LATS)** - The government has implemented the requirements of the Landfill Directive through the Waste and Emissions Trading Act 2003. This sets annual allowances limiting how much Biodegradable Municipal Waste (BMW) can be disposed of in landfill sites in any particular year. These allowances came into effect in April 2005. The Government's guidance on

[1] Waste Strategy 2000 for England and Wales, DETR, April 2000

Trading, Banking and Borrowing Landfill Allowances sets out the procedure for transferring landfill allowances. Authorities can buy more allowances if they expect to landfill more than their allocations and authorities with low landfill rates can sell their surplus allowances. It will also enable some authorities to save unused allowances (banking) or bring forward part of their future allocation (borrowing). Failure of an authority to deliver its obligations under LATS could result in the Government fining the authority £150 per tonne for every tonne in excess of its allowance.

The County currently landfills around 220,000 tonnes of waste which comes into its possession (2006/07 figures) and this is already a costly process which will become more costly even if current quantities remain static, notwithstanding any increase in quantities which may result from overall growth in waste arisings. The landfilling of waste also has a detrimental effect on the environment through the production of greenhouse gases. The Partnership is therefore committed to managing waste in a more sustainable way and treating waste as a resource. When waste is reused, recycled or composted, the materials produced reduce the need for virgin materials and therefore help to conserve natural resources. In addition, the pollution and negative impacts to the environment associated with extracting and transporting raw materials are avoided. This is also the case for energy recovery, where waste can be used to generate electricity in place of fossil fuels.

To bring further emphasis to the importance of waste prevention, reuse, recycling, composting and energy recovery, a waste hierarchy (Figure 1 below) was established through the Framework Directive on Waste[2]. The waste hierarchy provides a framework of how waste management can be made more sustainable. The aim for all stakeholders should be to move up the waste hierarchy: moving away from a reliance on disposal - to increased recycling, composting, reuse, and recovery and ultimately to waste reduction/prevention. It confirms that reducing waste at source is the best environmental option, and wherever achievable this principle has been employed in the development of this strategy. When assessing waste management proposals, the waste hierarchy has been used as a guide rather than being applied rigidly, as a certain amount of flexibility is needed to arrive at the most balanced environmental, social and economic solution.

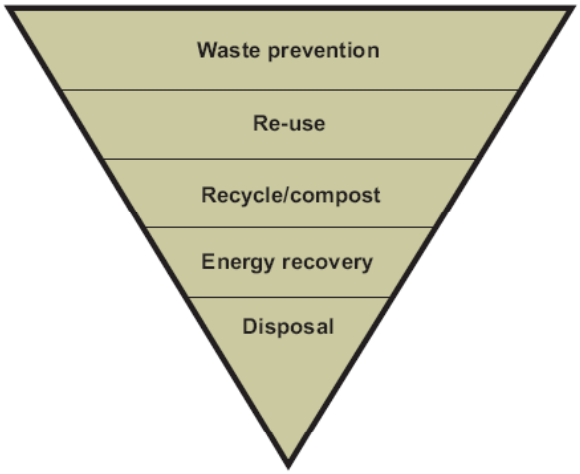


Figure 2-1: The Waste Hierarchy

[2] The Framework Directive on Waste (75/442/EEC)

2.3 What does the waste strategy cover?

This strategy details how the Lincolnshire Waste Partnership will seek to reduce waste at source and handle and treat the municipal waste which comes into its possession, and which is comprised of:

- Kerbside collected residual waste
- Kerbside collected recyclables
- Kerbside collected garden waste
- Recycling bring banks
- Bulky household items
- Waste taken to household waste recycling centres (HWRC)
- Street sweepings and litter
- Commercial and industrial waste where collected by the authorities
- Hazardous and clinical household waste
- Fly-tipped waste
- Waste from markets and educational establishments

The producers of industrial and commercial waste are responsible for making their own waste management arrangements and are not generally of primary consideration in this strategy. However, commercial and industrial organisations produce significant quantities of waste and the Lincolnshire Waste Partnership will consider the wider waste stream in future waste management options.

The Lincolnshire Waste Local Plan 2006 sets out detailed land-use policies and proposals for waste management and waste disposal in the County. The original (2002) waste strategy has been considered in the preparation of the Waste Local Plan 2006, which sets a framework for sustainable waste management and identifies specific sites for waste management use. As Lincolnshire moves away from reliance on landfill, this waste strategy helps determine the need for new types of facilities.

3 What are the key legislative drivers?

This chapter outlines the main legal requirements for waste management that the Partnership has either already met or will need to meet as new legislation and requirements are introduced. It then considers the legislation regarding planning for any new waste management facility that may be required to enable the Partnership to meet its future targets.

3.1 European waste policy and legislation

The European Union has become the major source of environmental legislation and guidance in relation to the management of waste. A number of European Directives have been introduced which aim to increase levels of recycling and recovery, and thus reduce the amount of waste which is landfilled, namely:

- Framework Directive on Waste (75/442/EEC)
- Landfill Directive (1999/31/EC)
- Directive on Packaging and Packaging Waste (94/62/EEC)
- Waste Electrical and Electronic Equipment Directive (2002/96/EC)
- End of Life Vehicles Directive (2000/53/EC)
- Ozone Depleting Substances (Regulation 2037/2000)
- Directive on Batteries (2006/66/EC)
- Waste Incineration Directive (2000/76/EC)

The main area of European legislation that this waste strategy has to consider is the Landfill Directive. This aims to prevent, or minimise, the negative effects on both the environment and human health caused by landfilling of wastes. It has and will continue to have a significant impact on landfill practices in the UK, as it bans certain materials from being landfilled, requires waste to be pre-treated before it is landfilled, and requires improvements to landfill management. The introduction of the Directive has resulted in a significant reduction in the number of landfill sites in the UK accepting hazardous wastes. The ban on the landfilling of certain wastes, such as tyres, from 2006 has meant that new arrangements for their collection and management have been introduced.

Landfilled biodegradable waste is a major source of methane: a greenhouse gas over 20 times more potent than carbon dioxide in terms of global warming. The Landfill Directive will require the amount of BMW sent to landfill in the UK to be reduced:

- to 75% of 1995 levels by 2010,
- to 50% of 1995 levels by 2013, and
- to 35% of 1995 levels by 2020.

The UK Government has implemented the requirements for reducing the landfilling of biodegradable waste through the Waste and Emissions Trading Act 2003. This sets Waste Disposal Authorities (such as Lincolnshire County Council) annual allowances limiting how much BMW can be landfilled in any particular year. The Government will fine authorities that do not achieve their annual targets. However it will allow authorities to achieve targets by buying allowances from other Waste Disposal Authorities if they expect to landfill more than their allocations, or to sell their surplus if they expect to landfill less.

The allowances for Lincolnshire County are:

- 194,120 tonnes of BMW to landfill in 2005/06
- 131,376 tonnes of BMW to landfill in 2009/10
- 87,506 tonnes of BMW to landfill in 2012/13
- 61,231 tonnes of BMW to landfill in 2019/20

This waste strategy outlines how the Partnership intends to meet or better these targets, and thus avoid the need to either pay fines or purchase allowances. Information on the other relevant EU legislation that the JMWMS has to consider can be found in Appendix 1.

3.2 UK waste policy and legislation

Although most waste legislation in the UK has been introduced to meet the requirements set by European Directives, the UK Government has also introduced additional legislation, some of which is specifically aimed at encouraging recycling:

- The Financial Act 1996 and Landfill Tax Regulations 1996
- Waste Minimisation Act 1998
- Local Government Act 1999 – Best Value Regime
- Animal By-Products Order and Regulations 2003
- The Waste and Emissions Trading Act 2003
- Household Waste Recycling Act 2004
- Clean Neighbourhoods and Environment Act 2005

The Waste and Emissions Trading Act 2003 has changed the relationship between waste collection and waste disposal authorities. It requires that two-tier authorities have a joint waste management strategy in place. The Act also gives waste disposal authorities the power to direct waste collection authorities to deliver waste in a state of separation that would increase recycling.

3.3 Waste strategy for England

The Government first published a National Waste Strategy in 2000. An updated Waste Strategy for England was published (following consultation during 2006) in May 2007.

The aim of the updated Waste Strategy, which sets the Government's vision for sustainable waste management, is to reduce waste by making products with fewer natural resources, and thus breaking the link between economic growth and waste growth. Products should be re-used, their materials recycled, and energy recovered, so that landfilling of residual waste should occur only where necessary.

The key points in the National Waste Strategy 2007 that are relevant to this strategy are:

- Waste minimisation - A strong emphasis on waste prevention with:
    - householders reducing their waste;
    - businesses helping consumers, for example, with less packaging;
    - development of a service which will enable households to opt-out of receiving un-addressed as well as addressed direct mail
    - a reduction in the use of free single-use plastic bags, and
    - an aspirational target of reducing residual waste production to a level of 225kg/head by 2020.

- Recovery of municipal waste – 53% by 2010, 67% by 2015 and 75% by 2020.
- Recycling – Targets to recycle or compost at least 40% of household waste by 2010, rising to 45% by 2015 and 50 per cent by 2020. This is a significant increase on the targets (30% by 2010 and 33% by 2015) in the previous Waste Strategy 2000.
- Treatment of residual waste - Increasing the amount of energy produced by a variety of energy from waste schemes, using waste that cannot be reused or recycled. It is expected that from 2020 a quarter of municipal waste nationally will produce energy, compared with 10% today.

More information on the new national Waste Strategy for England can be found in Appendix 1. This JMWMS outlines how the Partnership will meet or better the above national targets in the longer term.

3.4 Regional policies

This strategy is influenced in various ways by other plans and strategies that have been considered during the development of the SEA and are listed in Appendix 1. These include:

- Regional and local plans
- Waste management in neighbouring local authorities

These documents cover various different timescales, however, the Partnership needs to assess the impact they may have on its Waste Strategy over the longer term.

The East Midlands Regional Strategy sets out the principles and priorities for waste management for the Region:

- working towards zero growth in waste at the regional level by 2016;
- reducing the amount of waste sent to landfill in accordance with the EU Landfill Directive;
- exceeding Government targets for recycling and composting, with the objective to bring all parts of the region up to the levels of current best practice; and
- taking a flexible approach to other forms of waste recovery, on the basis that technology in this area is developing very quickly and is difficult to predict over a 20-year period.

It sets ten broad priority issues for the region including: planning waste management infrastructures; promotion and education to change behaviour; increasing resource efficiency; reducing commercial waste; procurement and market development; and reducing fly tipping.

3.5 Planning policy guidance

The County Council has a statutory duty to prepare a waste and minerals Local Development Framework, which sets out its policies and proposals for waste and mineral land use. This document in turn is used to assess waste and mineral planning applications. Planning decisions on waste treatment facilities taken now and in the near future will influence whether or not the UK will be able to meet the landfill diversion targets set by the Landfill Directive.

Planning Policy Statements (PPS) set out the Government's national policies on different aspects of land use planning in England. The following planning policy documents will have an impact on planning for any future waste management facility:

- Planning Policy Statement 10: Planning for Sustainable Waste Management
- Regional Spatial Strategy
- Waste Development Framework.

The Lincolnshire Waste Local Plan was adopted in May 2006, and sets out detailed land-use policies for waste management within Lincolnshire.

The role of the Waste Local Plan is to:

- set the policy framework for the most sustainable approach at the present time, and over the Plan period, for dealing with waste planning in Lincolnshire;
- provide a land use and development control interpretation of the Municipal Waste Management Strategy for Lincolnshire and the Draft Regional Waste Strategy for the East Midlands; and
- provide the criteria and standards by which planning applications for waste management developments can be judged.

Through Section 38(6) of the Planning and Compulsory Purchase Act 2004 the Plan's policies will take precedence over other matters, although the Plan can be overridden if a particularly strong case is made on other planning grounds.

The Waste Local Plan identified suitable sites for a number of technologies.

Within the context of European, National, Regional and countywide strategies for dealing with the many waste streams, the Waste Local Plan's strategic approach is to:

- promote waste minimisation and recycling and reuse through the land use planning system;
- with the exception of some hazardous wastes (which will require treatment and disposal outside of the County), ensure the provision of an adequate range of waste management and disposal facilities to meet the identified needs;
- minimise the transportation of waste from its source;
- make the Plan as location specific as possible and in other instances define areas of search;
- safeguard the existing network of waste management facilities from alternative development of a non-waste management nature;
- identify areas where waste facility development would be inappropriate;
- facilitate the development of integrated recovery and treatment facilities;
- facilitate the development of recycling facilities in locations where direct linkages can be made to companies using recyclables in their processes;
- show flexibility in responding to technical change in the provision of new facilities and processes;
- ensure that adequate landfill capacity is maintained to meet the needs of the County for the disposal of waste that cannot be reused, recycled or treated; and
- ensure the sitting of waste management facilities does not result in an unacceptable risk to the environment, human health or the amenity of the area.

4 How has the strategy been developed?

4.1 Background

The first Joint Municipal Waste Management Strategy for Lincolnshire was originally adopted in April 2002.

As part of the original strategy, stakeholders were consulted and subsequently an options assessment was carried out by SLR Consultants in March 2002 which evaluated the impacts of differing waste management activities in terms of cost, planning, sustainability and environmental objectives.

A review of the strategy was undertaken in 2005. A further review took place in 2006/07, which identified that a new joint waste strategy and a SEA were required.

4.2 Development of a new waste strategy

This strategy has been compiled following Government guidance on waste management strategies and assessed in accordance with the ODPM guidance 'A Practical Guide to the Strategic Environmental Assessment Directive' (2005)[3].

The strategy development process has followed a series of stages that enabled maximising stakeholder involvement. These stages are as follows:

- Develop the Waste Strategy Objectives
- Develop a series of waste management options
- Develop a set of weighted socio-economic and environmental assessment criteria
- Test how well the waste management options perform
- Assess the compatibility of the assessment criteria
- Prepare the Environmental report and Draft Strategy
- Monitor the implementation of the Strategy

The Lincolnshire Waste Partnership has consulted with stakeholders and the public during the process of developing the waste strategy. Two key consultation stages are included in the strategy development process:

- Scoping Stage – Statutory stakeholders were asked to comment on the waste strategy objectives, options, assessment criteria and weightings
- Consultation on the Draft Strategy and Environmental Report – Statutory stakeholders and the public have been consulted using a variety of methods including workshops, questionnaires and roadshows to provide opinion and feedback regarding the relative importance of the assessment criteria used to evaluate the options.

[3] The Department for Communities and Local Government (DCLG), http://www.communities.gov.uk

4.3 Scoping stage

At the scoping stage of the strategy development process, statutory stakeholders were asked to provide their feedback on a number of issues. These included:

- Is the proposed SEA methodology appropriate to cover the issues relevant to the Partnership's waste strategy?
- Are there any local issues not covered (or inadequately covered) in the Waste Strategy which need to be further assessed in the SEA?
- Does the initial list of assessment criteria cover the complete range of issues that are required to be considered in an SEA for the Partnership's waste strategy?
- Assuming an approach following the waste hierarchy, are there any other technologies which should be considered in the assessment of alternatives?
- Are the proposed weightings assigned to the evaluation criteria that will be used to assess the Waste Strategy options appropriate?

The statutory bodies consulted and their responses to the consultation are provided in appendix 2. The feedback received was incorporated as relevant to the development of the SEA methodology. In summary, the consultees provided a range of responses including:

- The need for the SEA to consider an in-vessel composting facility to allow separate collection of cooked and uncooked food waste in addition to green waste
- A number of comments on the criteria assessment and proposed weighting. These are listed in Appendix 2
- Establishing the economic benefits of the new facility in terms of the jobs created that can be filled by the local workforce
- The strategy needs to have a clear waste minimisation focus
- The need to consider "birdstrike" as a human factor in relation to the RAF's activity in the county
- The impact of population Growth Point for Lincoln and Grantham
- The consideration of potential impacts of the strategy on the historic environment

4.4 Public consultation

As part of the waste strategy development and SEA process, there is a statutory requirement to undertake public consultation. It is recommended that the public consultation period lasts for 12 weeks, but this is not statutory. The public was consulted on the proposed Draft Strategy and the Draft Environmental Report, which presented the outcomes of the Strategic Environmental Assessment (SEA).

The Partnership carried out the public consultation between 21 December 2007 and 7 March 2008. The documents made available during the consultation period were:

- The full Draft Strategy and appendices
- Summary of the strategy objectives
- Draft Environmental Report and its appendices

The consultation took the following forms:

- Web based consultation documents and questionnaire
- Postal questionnaire
- Workshops
- Roadshows

The results of the questionnaire show a broad acceptance of the new strategy. The objectives of the strategy have been accepted as being a good basis for helping the Partnership deliver more sustainable waste management services in the county. Respondents were positive about all the statements and agreed that the Partnership needs to reduce the amount of waste produced, and encourage the public through education and awareness campaigns to do more recycling and help minimise waste. It was also considered important that the Partnership maximises the value recovered from waste.

In term of alternatives to landfill, respondents were keen that the decision process should be governed by the environmental impact, the impact a new facility would have on the local communities and on cost. This is compatible with the weightings, agreed through the workshops, to be used in the criteria assessment to identify a preferred residual waste treatment option.

The outcomes of the workshops were that delegates agreed with the overall strategy but that the wording of some objectives needed to be amended. The proposed recycling targets were judged too low and that they should be in excess of 50%. In terms of technology option, there was a clear agreement in both workshops that Energy from Waste (EfW) was the preferred option to treat residual waste in Lincolnshire.

The workshop played a crucial role in setting the weightings for the criteria that have been used in the final version of the SEA.

Further details on the public consultation and its outcomes can be found in Appendix 3.

5 Where are we today?

In order to develop a robust long-term strategy we have assessed the existing baseline data and information and have determined the impacts that key drivers will have on waste management services in Lincolnshire. This section provides details of the waste services provided, the quantities of waste produced, and the performance levels being achieved.

5.1 Demographics

Within the East Midlands Region, Lincolnshire is the largest County covering 592,075 hectares, and the fourth largest in England covering 5% of England. Lincolnshire had one of the fastest growing populations in England between 1991 and 2001: at 10% compared to 3% nationwide. Lincolnshire's population grew by a further 5% between 2001 and 2005, with wide changes between the districts. North Kesteven grew by a further 8.2% compared to 2.9% in South Kesteven, and in general the rural areas are growing faster than Lincoln City. Looking at the population, Lincolnshire has an ageing population with more than 19% of its population being over 65 years of age, with the highest proportion residing in East Lindsey at 23%.

Lincolnshire was home to 678,700 people in 2005[4], living predominantly in rural areas (70%). The average household is made up of 2.26 persons compared to 2.36 for England as a whole.

5.2 Waste arisings

5.2.1 Current arisings

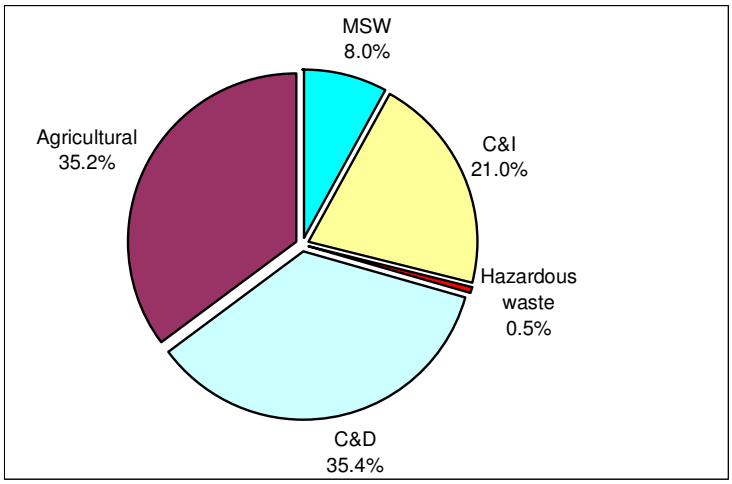
The overall arisings of all solid waste in England and Wales were estimated to be about 375 million tonnes in 2004. This includes nearly 100 million tonnes of waste from mining and quarrying, which is not subject to control under the EU Waste Framework Directive, and nearly 220 million tonnes of controlled wastes from households, commerce and industry (including construction and demolition wastes). Household wastes represent about 9% of controlled waste arisings. The total arisings of agricultural wastes, which includes manure and straw, are estimated to be 45 million tonnes. Other wastes, which include forestry wastes and fishing wastes, represent about 1% of total waste arisings.

Controlled waste is defined as waste from the following sources:

- Municipal Solid Waste (MSW);
- Waste arising from commercial premises (such as shops, offices and restaurants);
- Waste arising from industrial premises
- Waste arising from construction and demolition (C&D) activities; and
- Certain agricultural wastes (this only covers a small percentage of total agricultural waste arisings).

[4] The Changing Demographics of Lincolnshire - An update on population trends in the county, November 2006. http://www.research-lincs.org.uk/

Lincolnshire accounted for 16% of the East Midlands waste arisings in 2003 at 4,184,539 tonnes of waste. As a predominantly rural county the most significant waste stream is that which comes from agricultural services, which represented 35% of the total waste stream in 2003. This should be compared with a municipal waste stream which represented 8% of the total arisings in 2003[5]. Figure 5-1 below sets out the relative levels of each type of waste produced in Lincolnshire, along with the tonnages.



Source: Regional Waste Strategy for the East Midlands, 2006
C&D: Construction Demolition waste; C&I: Commercial and Industrial waste

Figure 5-1 Principal waste streams arising in Lincolnshire (2003)

It should be noted that the vast majority of agricultural wastes are not controlled under waste management legislation. The majority of agricultural wastes (*e.g.* slurry) are recycled to land and the provision of facilities for the management of these wastes is outside the scope of this strategy.

Municipal solid waste (MSW) is defined as household waste and any other waste collected by Waste Collection Authorities or its agents including waste from gardens and parks which comes into the possession of Waste Disposal Authorities, trade waste and waste resulting from the clearance of flytipped materials. Household waste includes waste from kerbside collection rounds (residual, dry recyclables and garden waste); Household Waste Recycling Centres (HWRC); bring schemes; bulky waste collection; hazardous waste collection, and street sweepings.

Table 5.1 shows the breakdown of MSW across Lincolnshire with 365,537 tonnes arising in 2006/07 of which 96% is household waste.

Table 5.1 Summary of Municipal Waste Arisings in Lincolnshire 2006/07

Waste Stream	2006/07 (tonnes)	% of Total waste stream
Municipal Waste	365,537	100%
Household Waste	349,663	96%
Waste Collected at HWRCs	76,043	21%
Waste Collected by WCAs	283,505	78%
Household waste recycled	140,950	40%

[5] Lincolnshire waste Local Plan, 2006

Table 5.2 presents a breakdown by district of current waste collected and recycled at the kerbside, and waste recycled at the county HWRCs.

Table 5.2 Kerbside Collection and Household Waste Recycling Centre Data 2006/07

	Boston	East Lindsey	Lincoln	North Kesteven	South Holland	South Kesteven	West Lindsey	HWRCs (excl C&D)
Total number of households	26,710	62,786	39,446	44,453	37,004	56,476	37,348	n/a
Number of households – dry recyclables	26,710	62,786	39,446	44,453	36,250	56,476	37,348	n/a
Number of households – green waste	0	56,131	27,476	43,096	0	18,370	13,000	n/a
Collected residual waste (t)	17,060	31,664	21,405	20,350	23,587	34,471	23,095	24,543
Collected dry recyclables (t)	5,283	7,848	3,850	13,320	6,715	5,390	4,868	18,806
Collected green waste (t)	0	9,413	7,048	12,924	29	7,451	4,914	19,665
Total waste arising (t)	23,903	54,352	37,607	47,776	31,894	52,804	36,094	63,013
Recycling rate (%)	**26.2**	**35.9**	**36.1**	**56.4**	**23.2**	**31.9**	**33.1**	**59.8**

5.2.2 Waste growth

The total amount of municipal waste generated in Lincolnshire has increased over the last decade, although the average growth rate has reduced from 6% between 1996-2001 to 2.12% between 2000-2006. Table 5.3 below provides a summary of waste growth trend from 2000 to 2006.

Table 5.3 Waste growth trends in Lincolnshire between 2000 and 2006

Year	Tonnage of MSW	% Change
2000/01	322,715	
2001/02	333,927	3.47
2002/03	339,724	1.74
2003/04	340,982	0.37
2004/05	362,662	6.35
2005/06	359,990	-0.74
2006/07	365,537	1.54
Average Rate of Change		**2.12**

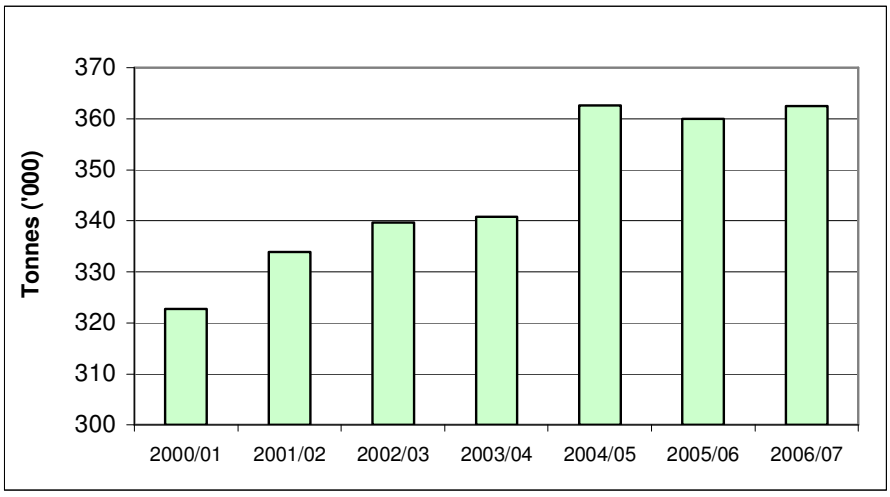


Figure 5-2 Annual Tonnage of MSW Arising in Lincolnshire

The growth rate from one year to the next has not been consistent. In particular, although there was an overall reduction in 2005/06 compared to the previous year, waste arisings increased again the following year.

However, the underlying overall trend has been around 2% year on year growth. In order to make future waste growth projections to develop this strategy, it has been assumed that the waste growth rate between 2007 and 2026 continues at just less than 2%, using a medium growth scenario of 1.7% annual waste growth. This takes into consideration the forecasted housing growth for the County. When these trends are applied municipal waste generation is projected to reach 423,200 tonnes by 2015 and 460,000 in 2020. The subject of waste forecasting is covered in more detail later in the strategy.

5.3 Waste composition

It is important to understand the composition of the waste collected from within the county, as this will determine the available proportions of materials that can be extracted and recovered from the waste. It is also key to assessing the types of facilities required and collection systems needed to extract each component of the waste. In Lincolnshire, Lincoln City (2000), East Lindsey and South Kesteven (2004) have conducted research into the composition of mixed residual waste collected from householders. Lincoln City's research was conducted in October 2000, sampling waste from 200 randomly selected properties, allowing a very detailed analysis of waste to be undertaken.

Table 5.4 presents a comparison of the outcomes of the waste composition studies completed, however this should be used carefully as each study used a different methodology.

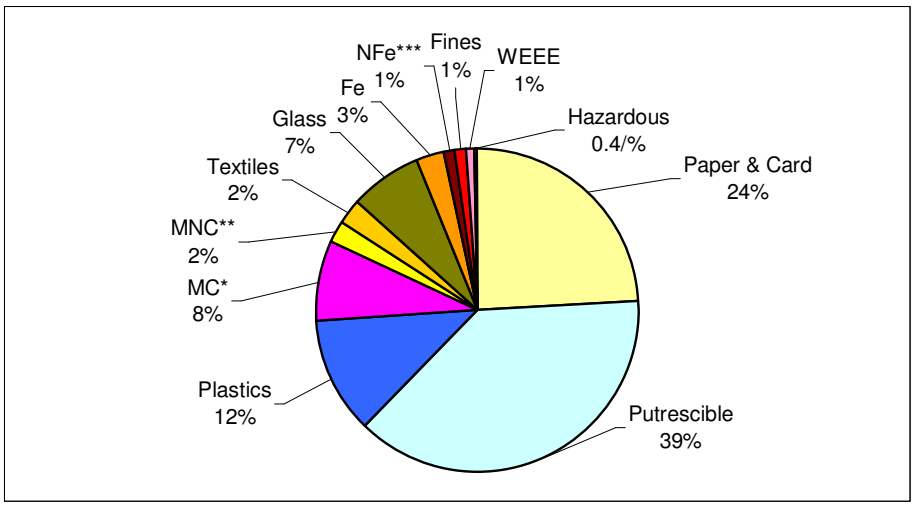
Table 5.4 Waste Composition Comparison

	East Lindsey (2004)	Lincoln City (2000)	South Kesteven (2004)
Category	**% of the total weight**	**% of the total weight**	**% of the total weight**
Recyclable paper	26.7%	12.7%	13.8%
Recyclable card	4.9%	5.4%	
Non-recyclable paper/card	3.1%	1.2%	4.2%
Garden waste	2.6%	5.4%	45.5%
Kitchen waste	26%	31.5%	
Animal waste	1.9%	5.2%	0.0%
Plastic film	5.6%	6.0%	6.8%
Dense plastic	5.1%	6.4%	5.4%
Textiles	1.3%	3.0%	3.0%
Miscellaneous combustible	1.6%	7.3%	7.4%
Miscellaneous non-combustible	4.0%	0.1%	2.9%
Glass	7.0%	7.7%	5.7%
Non-recyclable glass	0.5%	0.9%	
Ferrous metals	2.3%	3.5%	2.7%
Non-ferrous metals	0.8%	0.9%	0.7%
Other metals	0.3%	0.4%	0.0%
Fines	1.9%	0.5%	0.9%
Wood	1.5%	0.5%	0.0%
WEEE	0.6%	0.7%	0.9%
Hazardous	0.6%	0.2%	0.0%
Clinical	0.2%	0.1%	0.0%
Other		0.5%	
Total	**100%**	**100%**	**100%**

The assumed average composition for the county, based on this combined researches, is presented in Figure 5-3.

It is important to note that MSW has a high proportion of biodegradable wastes (paper and organics). These wastes break down under biological action in landfills to produce greenhouse gases, and thus are the primary target of new waste legislation designed to reduce emissions of greenhouse gases.

It is worth noting that the results of the two local studies showed a higher proportion of kitchen waste compared to WRAP's estimate of 19% for England.



* MC: Miscellaneous Combustibles, **MNC: Miscellaneous Non Combustibles, *** NFe Non Ferrous Metal

Figure 5-3 Average Waste Composition for Lincolnshire

5.4 Current Waste Management

The current waste management infrastructure needs to be reviewed to provide a baseline on which to develop the Waste Strategy. This review focuses on:

- Waste collection services
- Recycling and composting
- Treatment and disposal of residual waste
- Existing contracts
- Current waste management cost
- Best Value Performance Indicators, which are being replaced by the new Nation Indicators as of April 2008

5.4.1 Waste Collection

Within Lincolnshire it is the district councils (as WCAs) that have the responsibility to collect the waste, and the County Council (the WDA) that has the responsibility to dispose of it. This has resulted in a variety of different collection services and service providers (either in-house or contractor).

Table 5.5 below provides a summary of the current collection services offered by district councils.

Table 5.5 Collection Services offered by the Waste Collection Authorities (WCAs)

Local Authority	Residual Waste	Dry Recyclables	Green Waste
Boston	Alternate weekly collection majority in 240 litre bins	Alternate weekly in 240 litre bins Mixed paper, card, plastic bottles, tins and cans	Not currently collected
East Lindsey	Alternate weekly collection majority in 180 litre bins	Alternate weekly in 240 litre bins Mixed paper, card, plastic bottles, tins and cans	Alternate weekly in 240 litre bin
City of Lincoln	Alternate weekly collection in 240 litre bins or weekly collection in 140 litre bins (inner city areas)	Alternate weekly in 240 or 140 litre bins Mixed paper, card, plastic bottles, glass, tins and cans	Alternate weekly in 240 litre wheeled bin
North Kesteven	Alternate weekly collection majority in 240 litre bins	Alternate weekly in 240 litre bins Mixed paper, card, plastic bottles, glass containers, textiles, tins and cans	Alternate weekly in 240 litre bin
South Holland	Weekly black sack collection	Weekly sack collection Mixed paper, card, plastic bottles, plastic film, textiles, tins, cans and glass	Not currently collected
South Kesteven	Alternate weekly collection majority in 240 litre bins	Alternate weekly in 240 litre bins Mixed paper, card, plastic bottles, textiles, tins, cans and glass	Opt in system with a bin charge. Alternate weekly 240 litre bins
West Lindsey	Weekly collection majority in 180 litre bins	Alternate weekly in 240 litre bins Plastic bottles, glass, card, tins and cans Separate paper collection.	Opt in system with a bin charge. Alternate weekly 240 litre bin

In addition to the above services, the County Council operates 12 HWRCs across the county to enable residents to recycle, compost and dispose of waste materials. Table 5.6 below summarises the facilities provided at each HWRC.

Table 5.6 Materials accepted at Household Waste Recycling Centres in 2007

Site Name	Landfill Waste	Plastic Bottles	Plastic Bags	Hard Plastics	Wood	Books and CD	Used Engine Oil	LPG Cylinders	Fluorescent Tubes	Fridges & Freezers	TVs and Monitors	Used Car Batteries	Household Batteries	Printer Cartridges	Household Chemicals	Paper	Cardboard	Scrap Metals	Tins and Cans	Textiles	Green Garden Waste	Soil and Rubble	Glass Bottles
Great Northern Terrace	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Spalding	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Skegness	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Grantham	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Louth	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✘	✔	✔	✔	✔	✔	✔	✔	✔	✔
Sleaford	✔	✘	✘	✘	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Bourne	✔	✘	✘	✘	✘	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Gainsborough	✔	✔	✔	✘	✔	✘	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Boston	✔	✔	✔	✘	✔	✘	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Kirkby on Bain	✔	✔	✔	✘	✔	✘	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Leadenham	✔	✘	✘	✘	✔	✘	✔	✔	✔	✔	✔	✔	✘	✘	✔	✔	✔	✔	✔	✔	✔	✔	✔
Whisby	✔	✘	✘	✘	✔	✘	✔	✔	✔	✔	✔	✔	✘	✘	✔	✔	✔	✔	✔	✔	✔	✔	✔

Residual waste collection and disposal

Residual waste facilities in the county are currently based on the use of ten landfill sites. During 2006/07 Lincolnshire County Council disposed of a total of 219,361 tonnes of waste at these sites.

This strategy forms a key document in addressing the long-term infrastructure requirements for the treatment of residual waste. In order to implement a successful new waste strategy in Lincolnshire it is important to consider the current landfill contracts and future requirements. Table 5.7 summarises for each landfill site the type of contract, length of contract and minimum tonnages contracted.

Table 5.7 Landfill Contracts 2007

Site	Operator	Current minimum contract obligation (tonnes)	End of contract
Immingham	WRG	0	2012
Middlemarsh	WRG	5,000	Life of site
Kirkby on Bain	WRG	5,000	Life of site
Leadenham	WRG	20,000	Life of site
Colsterworth	WRG	20,000	Life of site
Boston	WRG	20,000	Life of site
Gainsborough	WRG	5,000	Life of site
Kenwick	WRG	Closed	Expired
Whisby	WRG	Closed	Life of site
North Hykeham	WRG	0	2012

A number of waste transfer stations are currently used for the bulking up of dry recyclables and residual waste prior to onward transportation to treatment and disposal sites. The current arrangements are as follows:

Bolingbroke Road, Louth

- Used by East Lindsey District Council for approximately 20,000 tonnes of residual waste destined for Kirkby on Bain Landfill.
- Used by East Lindsey District Council for approximately 13,000 tonnes of recyclables destined for Greenstar MRF at Addlethorpe, near Skegness. From April 2008 all of East Lindsey's recyclables will be delivered to the transfer station, and will be sent to an out-of-county material recovery facility (MRF) pending completion of the new Lincoln MRF.
- Used by West Lindsey District Council for approximately 2,000 tonnes of residual waste destined for Kirkby on Bain Landfill.

Fen Road Depot, Boston

- Used by Boston Borough Council for all of its dry recyclables destined for out-of-county MRF.

Stamp End Depot, Waterside South, Lincoln

- Used by City of Lincoln Council for all of its dry recyclables destined for out–of-county MRF (pending completion of new Lincoln MRF).

Mid UK Transfer Station, Market Deeping

- Used by South Holland District Council for all of its dry recyclables destined for Mid UK MRF at Caythorpe.
- Used by South Kesteven District Council for half of its dry recyclables destined for Mid UK MRF at Caythorpe.

As indicated above the County Council has entered into a contract to construct and operate a centralised MRF in Lincoln that will be available to the waste collection authorities to use in the near future (estimated completion date 2009).

Side waste policy

All authorities that are using wheelie bins for their residual waste collection have a "no side waste policy" in place. This means that residents are not allowed to place other wastes, e.g. sacks alongside their wheelie bins. South Holland operates a sack collection system and will collect side waste.

Collection of trade waste

Currently each district has its own policy on trade waste collection. The Partnership is working towards having a common policy on this area of service provision.

Bulky household waste collection

Bulky waste falls outside the scope of the regular collection service as these items are generally too bulky or too difficult to be handled by the normal means. The districts across the Partnership offer bulky waste collection on demand for item such as cookers, mattresses and other large household appliances. Each district has its own policy on charging for bulky collections.

Street cleansing

The waste collection authorities provide a regular service across their districts. Busy areas, such as shopping precincts and high streets usually have permanent cleaning staff or daily cleansing regimes. Street cleansing waste accounts for around 3% of municipal waste landfilled in the county. The Partnership is currently trialling the recycling of street sweeping waste in one district.

Clinical waste

Clinical waste is defined in the Controlled Waste Regulations 1992 and is the term applied to any waste which consists wholly or partly of:

- Human or animal tissue
- Blood or bodily fluids
- Excretions
- Drugs or other pharmaceutical products
- Swabs or dressings
- Syringes, needles

which unless made safe, may prove hazardous to any person coming into contact with it.

From January 2008 the County Council has introduced a new clinical waste collection and disposal service for householders producing this type of waste.

Abandoned and end of life vehicles

Abandoned vehicles that are on public land are removed in accordance with the relevant legislation and are dealt by each district within its area.

Fly tipped waste

Fly tipping is a serious national problem. As well as being unsightly it can lead to serious pollution of the environment and harm to human health, and is costly to remove and dispose of correctly. Across Lincolnshire 1,223 tonnes of waste was flytipped in 2006/07. The districts are responsible for clearing fly tipping in their area, and are now assisted by the County Council's Flytipping Team.

Recycling collection

Table 5.8 summarises the number of households in each districts that are currently provided with kerbside recycling and green waste collections.

Table 5.8 Households provided with recycling/green waste kerbside collection in 2006/07

	Boston	East Lindsey	Lincoln	North Kesteven	South Holland	South Kesteven	West Lindsey
Total number of HH	26,710	62,786	39,446	44,453	37,004	56,476	37,348
Number of HH – dry recyclables	27,000	62,786	39,446	44,453	36,250	56,476	37,348
Number of HH - green waste	0	56,131	27,476	43,096	0	18,370	13,000

Green waste collection

A green waste collection is standard service provision in East Lindsey, Lincoln City and North Kesteven. In West Lindsey and South Kesteven, residents may opt-in to having a green waste collection service on payment of a fee. Boston Borough and South Holland District Councils do not currently operate a green waste collection service. South Holland's policy for green waste is to encourage householders to compost at home, which is being actively promoted.

Green waste from kerbside collections and HWRCs is sent to a network of composting facilities across the county under contracts operated by the County Council. In 2006/07 59,589 tonnes of green waste was sent to these facilities which are identified in Table 5.9.

Table 5.9 Current Composting Facilities

Composting site	Location
Shaw Trust	Gainsborough
MEC	Lincoln
Organic Recycling Ltd	Crowland
Cranberry Composting	Boston
Mid UK Recycling Ltd	Caythorpe
Land Network (Sturgate)	Gainsborough
Land Network (South Elkington)	Louth
Land Network (Waddingham)	Waddingham

Dry recycling collection

All the districts operate a kerbside recycling collection, which includes a wide range of materials: mixed paper, card, plastic bottles, tins and cans. Additional materials, such as glass, are collected by some, and the Partnership is moving towards a more standardised recyclable stream where possible.

Five of the Waste Collection Authorities have contractual arrangements with differing private sector operators to process their dry recyclables. There are currently 5 MRFs used to process recyclable materials, two of which are located out of the county. In addition to these facilities the County Council has let a contract to construct and operate a centralised MRF that will be available for the waste collection authorities to use in the near future (estimated date 2009). Between them, the WCAs also have 197 bring sites enabling the public to recycle cans, paper, glass, textiles and books. Table 5.10 summarises where dry recyclables are sent for re-processing. Each district is responsible for waste collection arrangements and these are presented in Table 5.10 below.

Table 5.10 Current Dry Recycling Arrangements

	Current Material Description	Current Destination
East Lindsey	Mixed paper, card, plastic bottles, tins and cans collected fortnightly in wheeled bins	Greenstar Ltd, Addlethorpe, Skegness (County contract)
West Lindsey	Card, plastic bottles, glass containers, tins and cans collected fortnightly in wheeled bins Separate paper collection	Fox (Owmby) Ltd, Caenby Corner (District contract)
City of Lincoln	Mixed paper, card, plastic bottles, tins and cans collected fortnightly in wheeled bins	HW Martin Ltd (Handler) transporting to Grosvenor Ltd, Peterborough MRF or Transcycle Ltd, Derby. (County contract)
North Kesteven	Mixed paper, card, plastic bottles, plastic containers, glass containers, textiles, coat hangers, tins and cans collected fortnightly in wheeled bins	Mid UK Recycling Ltd, Caythorpe (District contract)
South Kesteven	Mixed paper, card, plastic bottles, plastic containers, glass containers, textiles, tins and cans collected fortnightly in wheeled bins	Mid UK Recycling Ltd, Caythorpe (District contract)
Boston	Mixed paper, card, plastic bottles, tins and cans collected fortnightly in wheeled bins	HW Martin Ltd (Handler) transporting to Grosvenor Ltd, Peterborough MRF, or Transcycle Ltd, Derby, (District contract)
South Holland	Mixed paper, card, plastic bottles, plastic containers, plastic film, textiles, coat hangers, glass, tins and cans collected weekly in boxes	Mid UK Recycling Ltd, Caythorpe (District contract)

Table 5.11 Current Dry Recyclables Collection Contract Arrangements

Boston	Service provided in-house
East Lindsey	Service provided in-house
City of Lincoln	New contract with Cory Environmental in 2006
North Kesteven	Service provided in-house
South Holland	Service provided in-house
South Kesteven	Service provided in-house
West Lindsey	Service provided in-house

5.5 Recycling and composting rates

Recycling and composting performance has changed significantly since 2002 when the original JMWMS was produced, primarily through the expansion and introduction of new collection services and the improvement of recycling rates at household waste recycling centres. Table 5.12 below provides details of the household waste recycling rates between 2001 and 2007 for each district and for the county overall. For 2006/07 district recycling rates ranged from 56% (North Kesteven) to 23% (South Holland), with the overall county recycling rate reaching 40%.

Table 5.12 Recycling/Composting Rates between 2001 and 2007

	2001	2002	2003	2004	2005	2006	2007
Boston	7%	7%	7%	28%	20%	22%	26%
East Lindsey	8%	7%	9%	17%	20%	21%	36%
City of Lincoln	10%	10%	11%	16%	24%	29%	36%
North Kesteven	5%	5%	16%	10%	39%	*52%*	56%
South Holland	9%	9%	15%	15%	16%	21%	23%
South Kesteven	7%	7%	7%	14%	15%	26%	30%
West Lindsey	7%	7%	9%	15%	24%	32%	33%
Lincolnshire	8.7%	8.4%	12.0%	18.1%	27.6%	33.9%	39.9%

Collectively, the Partnership successfully exceeded the 2006/7 statutory targets for recycling and composting.

Figure 5-4 below shows the proportions of recyclables and green waste collected by each district, and waste brought by residents to the twelve Household Waste Recycling Centres.

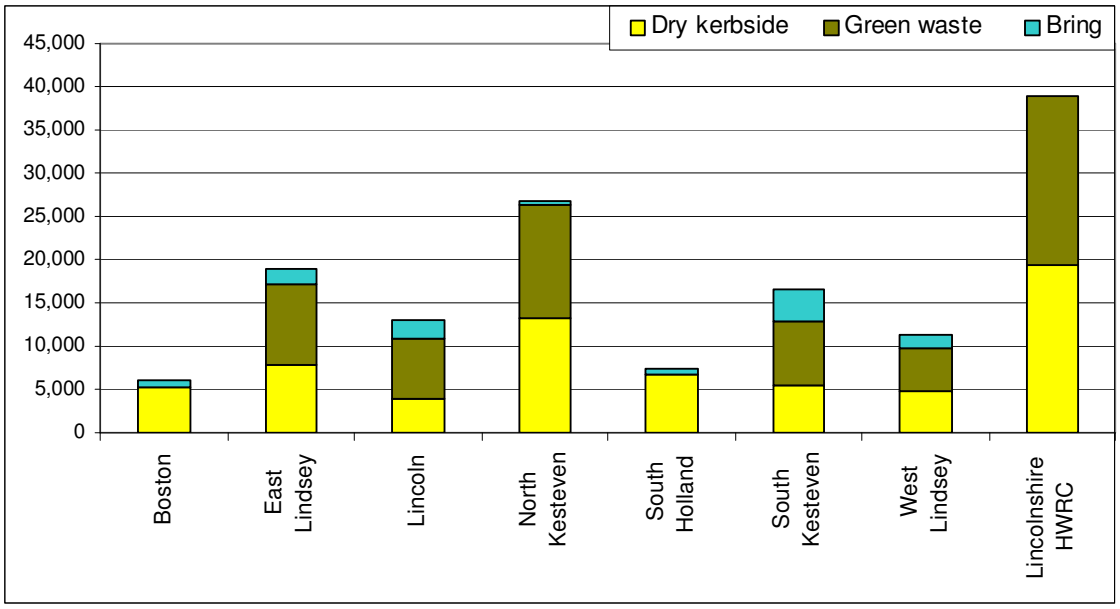
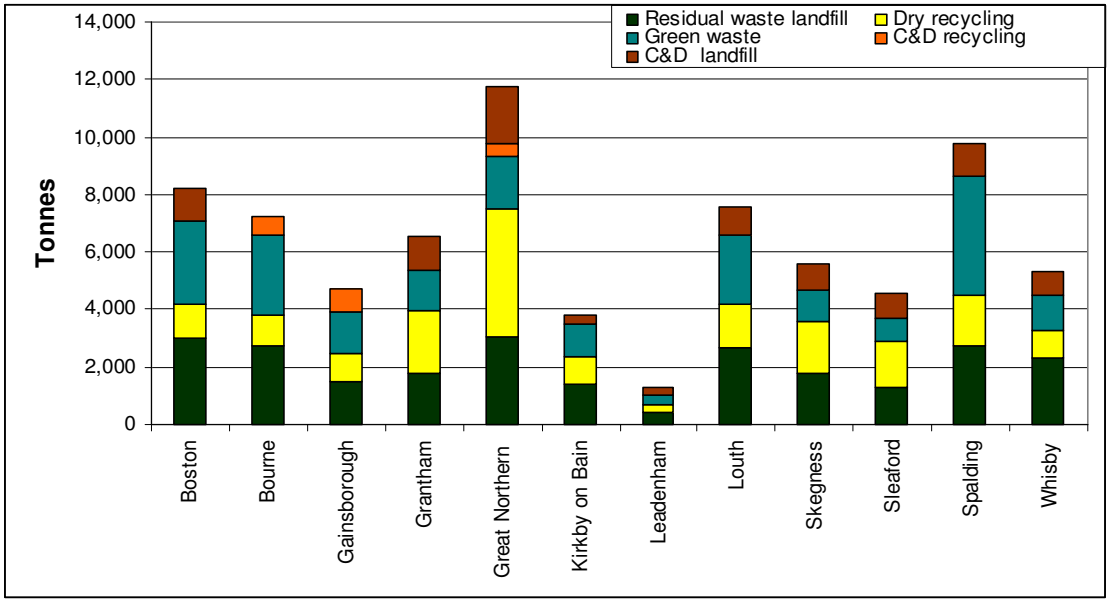


Figure 5-4 Breakdown Tonnages of Recyclables (tonnes) 2006/7

Household Waste Recycling Centres

The County Council operates twelve HWRCs which accept waste from householders. County Council policy is to not accept trade waste at any of its HWRCs. Figure 5-5 presents the tonnage breakdown for each Household Waste Recycling Centre.



C&D: Construction and Demolition waste

Figure 5-5 Tonnage breakdown by HWRC (tonnes) 2006/7

Table 5.13 shows the County Council's current contractual and operational arrangements for each Household Waste Recycling Centre.

Table 5.13 HWRC Contractual and Operational Arrangements

Site Name	Management responsibility
Great Northern Terrace	County Council
Sleaford	County Council
Skegness	County Council
Spalding	County Council
Grantham	County Council
Whisby	WRG
Leadenham	WRG
Kirkby on Bain	WRG
Boston	WRG
Louth	County Council
Bourne	Bullimores
Gainsborough	Greencycle

5.6 Current waste management costs

The costs of waste management in 2006/07 outlined in Table 5.14 and Table 5.15 are the costs reported by the individual authorities to Defra through Waste Data Flow. There are some noticeable variations between the districts: Boston has the lowest cost per household at £33.54, compared with £64.28 for East Lindsey.

Table 5.14 Cost of waste collection for 2006/07

Collection of household waste	Number of HH	Overall cost for collection	£/ HH
Boston[6]	27,130	£905,580	**33.54**
East Lindsey	63,423	£3,769,367	**64.28**
Lincoln	40,836	£2,103,621	**52.63**
North Kesteven	45,187	£2,211,074	**49.73**
South Holland	36,867	£1,808,976	**44.39**
South Kesteven	56,651	£2,646,292	**48.65**
West Lindsey	38,837	£2,273,242	**59.98**

Table 5.15 Provisional cost of waste disposal 2006/07

Final Disposal of household waste *(including landfill tax)*	Overall amount landfilled	Overall cost of disposal	£/ tonne
Lincolnshire County	365,537	£17,270,000	**£47.25**

[6] Data provided directly by Boston Borough Council

6 What are we aiming for?

Although the Partnership continues to increase the amount of waste it recycles, it needs to agree a way forward for managing the overall municipal waste stream with clear objectives and a robust plan of action.

This chapter identifies the challenges faced by the Partnership and the proposed approach to meeting these challenges.

6.1 Strategy objectives

The Partnership has developed and agreed a set of high-level objectives, which are key drivers for the Partnership to deliver this strategy. It is necessary that the objectives be constantly reviewed and updated as progress is made towards them. The ten objectives are as follows:

Objective 1. To prevent the growth in municipal waste by promoting waste reduction and reuse initiatives to ensure no more than 225kg of residual household waste per person per year is produced by 2020.

Objective 2. To promote waste awareness through co-ordinated public education and awareness campaigns, and effective community engagement.

Objective 3. Across Lincolnshire to achieve 55% recycling and composting by 2015.

Objective 4. Across Lincolnshire to achieve a uniform dry recyclables waste stream by 2013.

Objective 5. To increase progressively the recovery and diversion of biodegradable waste from landfill, to meet and exceed the Landfill Directive diversion targets.

Objective 6. To ensure that residual waste treatment supports energy recovery and other practices higher up the waste hierarchy.

Objective 7. To deliver best value for money waste management services, addressed on a countywide basis.

Objective 8. To engage with local businesses to encourage the reduction and recycling of commercial waste.

Objective 9. To engage actively, lobby and work with local, national, governmental and other organisations on sustainable waste management issues.

Objective 10. As Local Authorities to set an example by preventing, reusing, recycling and composting our own waste and using our buying power to encourage positively sustainable resource use.

6.2 The challenge we face

The Partnership's main challenge will be to meet the requirements set by the Landfill Directive on reducing the amount of biodegradable waste that is landfilled. The European Commission will be able to fine Member States who do not meet their landfill diversion targets. The current estimated level of this fine is set at 500,000 Euros (about £350,000) per day. Meeting the longer-term challenge set by the Landfill Directive will be made more difficult if the amount of waste that we are producing continues to increase.

The Partnership will also need to meet the requirements of the UK Government's new performance framework[7]. These comprise of 198 measures which represent what the Government believes should be the national priorities for local government, working alone or in partnership, over the next three years. These replaced all other sets of indicators, including Best Value Performance Indicators and Performance Assessment Framework Indicators, from April 2008. The new measures on environmental sustainability include three that are discussed in this waste strategy:

- NI 191 Residual household waste per head
- NI 192 Household waste recycled and composted
- NI 193 Municipal waste landfilled.

Other measures on environmental sustainability that are relevant to the waste strategy are:

- NI 185 Carbon dioxide reduction from Local Authority operations
- NI 195 Improved street and environmental cleanliness (levels of graffiti, litter, detritus and flyposting)
- NI 196 Improved street and environmental cleanliness – fly tipping.

Each district within the Partnership will maintain its high level of street cleaning, and will continue to take enforcement action against fly tippers if the source of the waste can be identified.

6.2.1 Growth in waste arisings

Meeting the longer-term challenge set by the Landfill Directive will be made more difficult if the amount of waste that we are producing increases.

Historically, waste arisings have been shown to grow in line with, or even above, the level of economic growth. Consequently, if this trend continues, a 3% p.a. growth in waste would result in a doubling of waste arisings in 20 years. However, the continuation of this trend is now considered to be unsustainable, and thus the European Commission's Sixth Environment Action Programme set an objective to achieve a decoupling of resource use from economic growth through significantly improved resource efficiency, dematerialisation of the economy, and waste prevention.

About 96% of the total MSW which is collected across the county is household waste, Thus in order to predict future MSW arisings, we have to focus our efforts primarily on forecasting growth rates for household waste.

[7] The New Performance Framework for Local Authorities & Local Authority Partnerships: Single Set of National Indicators. Department for Communities and Local Government, October 2007.

6.2.2 Household waste growth

Growth in household waste is due to two key factors:

- An increase in the number of households
- Growth in waste produced per household due to increased consumption

Waste minimisation and re-use initiatives aim to tackle the growth in waste produced by a household. However, even if these initiatives were to reduce the growth in waste per household to zero, then arisings of household waste would still increase as a result of an increase in the number of households. Consequently, unless waste minimisation activities reduce waste arisings per household at a faster rate than the growth in the number of households, overall waste arisings will continue to increase.

A number of models for predicting future waste arisings are available (these predict average growth rates of between 1% and 2% per year), and the Waste Strategy for England 2007 developed four growth scenarios for MSW in order to assess a range of possible future outcomes to 2020:

- 2.25% per annum reflecting recent trends in growth in consumer spending
- 1.5% per annum in line with national waste growth in the five years to 2004/05
- 0.75% per annum, in line with current projections of household growth and reflecting more closely national waste growth in the five years to 2005/06
- 0% growth, representing the possibility that waste growth will be decoupled from household and economic growth.

The East Midlands Regional Plan housing forecast set a predicted growth for households for each district across the Partnership to 2020. These vary across the Partnership. For the purpose of developing this strategy we have annualised the number of additional dwellings to be built from 2007 to 2020, and added the growth rate for waste per household. This resulted in an overall growth in waste generation of 1.7%. In order to achieve this level of overall waste growth, it will be essential that the waste minimisation and public education/ awareness activities identified in this strategy are implemented. Figure 6.1 illustrates the impact different waste growth would have on the amount of MSW arising annually.

Table 6.1 Projected waste growth rate for Lincolnshire

	Number of households	Household growth (%)	Waste growth rate/HH (%)	Overall waste growth rate (%)
2006	304,223			0.7%
2007	308,173	1.30%	0.40%	1.7%
2008	312,123	1.28%	0.42%	1.7%
2009	316,073	1.27%	0.43%	1.7%
2010	320,023	1.25%	0.45%	1.7%
2011	323,973	1.23%	0.47%	1.7%
2012	327,923	1.22%	0.48%	1.7%
2013	331,873	1.20%	0.50%	1.7%
2014	335,823	1.19%	0.51%	1.7%
2015	339,773	1.18%	0.52%	1.7%
2016	343,723	1.16%	0.54%	1.7%
2017	347,673	1.15%	0.55%	1.7%
2018	351,623	1.14%	0.56%	1.7%
2019	355,573	1.12%	0.58%	1.7%
2020	363,473	1.10%	0.60%	1.7%

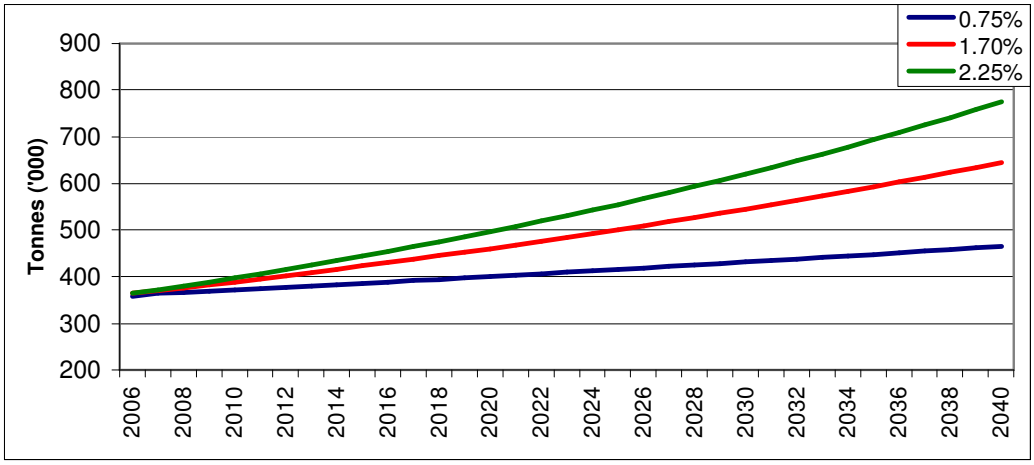


Figure 6-1 Effect of different household waste growth forecasts in Lincolnshire

6.2.3 Waste emissions trading legislation

The UK Government has implemented the Landfill Directive through the Waste Emissions Trading Act 2003. This spreads the responsibility for meeting the Landfill Directive target among all authorities and each disposal authority has been set targets for the amount of waste that it can landfill each year to 2020. It is important that every authority within the UK meets its target, so as to ensure that the UK's government will not have to pay any fines to the European Commission.

The targets, or allowances as they are referred to, are based on the presumption that MSW contains 68% of biodegradable material by weight. The initial allowance for biodegradable municipal waste (BMW) disposal for Lincolnshire County Council was set at:

- 194,120 tonnes of BMW to landfill in 2005/06
- 131,376 tonnes of BMW to landfill in 2009/10
- 87,506 tonnes of BMW to landfill in 2012/13
- 61,231 tonnes of BMW to landfill in 2020

The Waste Emissions Trading legislation enables the UK Government to fine authorities that do not meet their yearly targets. For English local authorities, the level of this fine is £150 for each tonne of BMW waste landfilled above the specified targets. The LATS targets were implemented in April 2005. The Government has recognised that while some authorities are already easily meeting their allowances because they have installed a suitable treatment plant, other authorities, which include the Partnership, will not be able to meet their longer-term targets until they have both increased the level of recycling and installed a suitable treatment facility to treat the remaining (residual) waste. Consequently, the legislation enables allowances to be traded between authorities. The aim of the trading of allowances is to enable authorities to meet their obligations through purchasing allowances at a lower cost than the cost of paying a fine to the Government, though the cost of the allowances could approach the level of the fine if demand is high.

If the amount of waste continues to increase at an average rate of 1.7% per year between now and 2020, the total amount of municipal waste in Lincolnshire will increase from its current level of about 365,000 tonnes per year to about 460,000 tonnes by year 2020.

If Lincolnshire achieves its overall recycling and composting targets of 55% by 2015 it means that in 2020 we will divert about 253,000 tonnes of waste (through recycling and composting), and there will remain a further 207,000 tonnes of residual waste to landfill. This will equate to about 115,000 tonnes of BMW, whereas the maximum Lincolnshire allowance for 2020 will be 61,231 tonnes. Thus Lincolnshire would exceed its allowance and would be fined as estimated £23.46 million. This would be equivalent to a fine of £65 per household in the year 2020 in addition to the basic costs of waste management.

In addition to establishing a clear direction for recycling and composting it is crucial that this strategy addresses how the residual waste is going to be treated and disposed of to avoid such costs.

7 How will we get there?

In order to deliver the aims and objectives to which the Partnership aspires, each element of the waste hierarchy needs careful consideration.

This strategy reinforces the initial commitment from past strategies and identifies new opportunities that will move the Lincolnshire Waste Partnership towards achieving its objectives. Lincolnshire currently disposes of 60% of its waste to landfill, which is at the bottom of the waste hierarchy. Therefore we must curb waste generation and invest in treatment technologies to move up the waste hierarchy: to ensure a more sustainable approach and to use waste as a valuable resource rather than landfilling it.

7.1 Waste minimisation and re-use

Waste reduction is at the top of the waste hierarchy (see Figure 1) and is pivotal to the development of sustainable waste management practices, although it is arguably the most difficult objective to achieve and measure.

Waste reduction refers to the minimisation of waste at source, which means not producing waste in the first place. In some countries, householders are charged to dispose of the actual amount of waste that they present for collection, and this has been shown to have an effect on the amount of waste produced and material recycled. However, so-called 'pay-as-you-throw' schemes are likely to be unpopular with a large section of the public. The Partnership may nevertheless wish to consider this approach in the long term.

The new National Waste Strategy (2007) places a strong emphasis on the prevention and minimisation of waste, setting an aspirational target of 225kg/head of residual waste, and includes the following initiatives:

- Government will work with the Direct Marketing Association to develop a service so that people will be able to opt-out of receiving un-addressed as well as addressed direct mail. The Government is also considering moving towards an approach where people would only get direct mail if they opted in by placing their name on the direct mail register.
- Government will work with retailers to reduce the use of free single use bags. This could involve retailers only selling long-life bags, or retailers charging for disposable bags and using the proceeds to sell long-life bags at a discount.

There are a number of other initiatives for reducing waste arisings. These include:

- Re-using plastic bottles, containers and carrier bags.
- Avoiding buying products that have excessive packaging.
- Purchasing longer lasting products, e.g. rechargeable batteries.

However, one of the greatest problems associated with this tier of the waste management hierarchy is quantifying how effective such programmes actually are. Although waste minimisation within industrial and commercial sectors appears to be more prominent in the public eye, due to the benefit of such schemes to participating businesses, the prevention of household waste has always been difficult to implement. In addition the Government approach to monitoring the diversion of biodegradable waste from landfill is in conflict with schemes such as discouraging the use of plastic bags in favour of biodegradable ones. However the Government is considering steps that will address this imbalance.

Lincolnshire's original waste strategy (2002) provided some discussion addressing the short, medium and long term actions required to deliver the then preferred options. This strategy is building on the existing programme and expanding it.

Lincolnshire has seen the average rate of waste growth slow down over the last decade (6% to 2%), although with the introduction of wheeled bin schemes and garden waste collections waste generation has fluctuated considerably. However, with a sustained approach to promoting waste prevention and minimisation activities, the Partnership aims to reduce the growth in waste even further.

Taking the above into consideration, the waste growth that has been agreed and applied to the scenarios modelled in the SEA, was set at 1.7% from 2007 onwards. This rate takes into consideration the growth in housing forecast for the county, although the actual waste growth per household is set at less than 1% (see Table 6.1).

The Partnership is working closely to develop and implement joint activities to drive waste reduction. Those already in operation or planned include the following:

- Joint public information and awareness campaigns – including a food waste awareness campaign
- Partners in WRAP home composting initiative (since January 2007)
- Lincolnshire Real Nappy campaign
- Prevention of junk mail
- Supporting community group and social enterprise activities
- Furniture re-use scheme
- Reduce packaging waste – by raising resident awareness and working with Trading Standards
- Mobile phone re-use and recycling campaign
- Wood reuse banks

These initiatives will help the Partnership work towards the zero waste growth target in the East Midlands Regional Waste Strategy.

7.1.1 Home Composting

For a number of years the County, Borough and District Councils have promoted the use of home composters by providing subsidised composters to residents. Since 2005 over 12,000 compost bins have been supplied to help householders deal with their garden waste at home. The Partnership is committed to encouraging more home composting, to minimise the quantity of waste requiring disposal.

7.1.2 Real nappies

In Lincolnshire around 9,500 tonnes of disposable nappies are thrown away every year and end up in landfill. The Partnership launched the Real Nappy Campaign in 2005 and offers a £30 cash back incentive to parents using real nappies. Since its launch 600 residents have used the scheme.

7.1.3 Re-use

The Partnership is fully supportive of waste reuse schemes and many of the district authorities offer encouragement through supporting furniture re-use projects that collect unwanted furniture that can be re-used. These re-use projects are usually run by charities or not-for-profit organisations. The Partnership will continue to support these programmes

actively and consider additional schemes that could improve the reuse of materials within the county and subsequently divert more material from landfill. Options being considered include mobile phones and wood reuse schemes.

7.2 Recycling and composting

The Partnership has increased its recycling and composting rate significantly since the original waste strategy was adopted (April 2002). This is the result of a dramatic change in waste collection services across the county. All of the districts provide a kerbside collection for recyclable materials, and five out of seven districts also provide green waste collections. The success of these schemes is reliant on the support and co-operation of householders.

The Partnership has set itself the following recycling target:

- **55% overall recycling by 2015**

This exceeds the Government's current target as set in Waste Strategy for England 2007[8], and the Regional target for 2015.

To achieve this target the Partnership is keen to achieve a greater commonality of services and continued delivery of improvements in performance. In order to deliver higher performance the Partnership recognises the need to increase the recycling performance of HWRCs, and to complete the Household Waste Recycling Centre network by providing sites at Stamford, Market Rasen, Long Sutton and Mablethorpe. Progress is being made to standardise the types of material accepted at all HWRCs, subject to site constraints.

The number of bring facilities will be reviewed and the expansion of existing recycling and composting services, to remote locations and problematic types of dwelling, will be considered wherever feasible.

The Partnership has an open mind towards the introduction of new services and the separate collection of differing materials such as food waste and the wide range of potential recyclables. As legislation is becoming more focused on individual materials within the waste stream, there may be an increasing requirement to extract and recover value from these materials.

In response to the introduction of new waste collection services, the County Council has procured a contract for a centralised materials recycling facility (MRF) to sort and bulk up recyclable materials collected by the district authorities, which is estimated to be on stream by 2009.

The Districts are all achieving different recycling and composting rates reflecting their individual circumstances, and will work closely to achieve the countywide 55% recycling/composting target by 2015.

[8] Waste strategy targets: 40% recycling by 2010, 45% in 2015 and 50% in 2020

7.3 Addressing the residual waste issue

Within Lincolnshire, in 2006/07, a significant proportion in (60%) of the residual waste (the waste that was not recycled, re-used or composted) was disposed of at landfills within or on the borders of the county.

While landfill is currently a flexible and cost-effective method to dispose of residual waste in Lincolnshire, increases in landfill tax and the Government landfill diversion targets will make it increasingly and significantly more expensive. In addition to the cost implications, landfilling of residual waste is an environmentally damaging and non-sustainable practice.

The Partnership is committed to continue the diversion of biodegradable waste through recycling and composting and is on course to achieve the 2010 landfill diversion target. However, despite high recycling rates, relying solely on recycling and composting will not be sufficient to meet the medium (2013) and long-term (2020) landfill diversion targets. Therefore, in addition to recycling and composting, a significant proportion of the residual waste will need to be treated in some way, other than landfilling, to ensure the Partnership meets its landfill diversion targets. This will require investment in new waste treatment infrastructure to treat approximately 150,000 tonnes per annum of residual waste.

Lincolnshire's original waste strategy identified that Energy from Waste treatment process formed the basis of the preferred option. However, as part of this new waste strategy, a Strategic Environmental Assessment has been completed both to re-evaluate this option and to assess other waste treatment technologies before confirming the preferred waste management scenario.

The selection of the scenarios was based around a number of objectives as set by the strategy:

- To manage our waste sustainably and to move up the waste hierarchy
- To minimise the amount of waste generated across the county
- To maximise the amount and range of materials recycled and composted to meet and exceed the National and Regional targets
- To limit the amount of waste landfilled and ensure landfill diversion targets are met
- To maximise recovery and use of waste as a resource

The treatment of residual waste has been modelled for a number of different technologies. The assumptions for each scenario are as follows:

- Baseline year is 2006/07 with MSW arising of 365,537 tonnes
- Average waste growth across the County of 1.7% (includes growth in the number of households)
- Increased recycling and composting rates to achieve 55% recycling in 2015 (23% composting, 32% recycling)
- Biodegradable content of MSW set at 68% as per the Landfill Allowance Trading Schemes Regulation 2004
- New residual waste treatment facility with a 150,000 tonnes per annum capacity to exceed the LATS diversion targets.
- Limited landfilling may continue but only within permitted allowance

The residual waste treatment options that have been assessed in the SEA are presented in Table 7.1.

Table 7.1 Residual Waste Treatment Scenarios

Scenario		
Scenario 1	Baseline	100% of residual waste to landfill
Scenario 2	Mechanical Biological Treatment with aerobic stabilisation phase	MBT with an aerobic stabilisation phase, the output is landfilled
Scenario 3	Mechanical Biological Treatment with Refuse Derived Fuel combusted on site	MBT with the output used as a RDF on site in a small scale energy from waste plant
Scenario 4	Mechanical Biological Treatment with Refuse Derived Fuel to a 3rd party	MBT with the RDF being sold to 3rd party such as cement kiln
Scenario 5	Mechanical Biological Treatment with anaerobic digestion and aerobic stabilisation phase	MBT with anaerobic digestion and aerobic stabilisation phases. The outputs are a compost product (which might be used in landfill engineering) and a biogas
Scenario 6	Mechanical Biological Treatment with anaerobic digestion and Refuse Derived Fuel combusted on site	MBT with anaerobic digestion and aerobic stabilisation phases. There are two outputs: a stabilised output which is landfilled and a RDF which is used on site
Scenario 7	Energy from Waste + Electricity	Energy from waste with electricity generation
Scenario 8	Energy from Waste + Combined Heat and Power	Energy from waste with electricity and heat generation
Scenario 9	Gasification	Advanced thermal treatment (ATT)

These scenarios and technologies are fully explained and developed in the accompanying Environmental Report.

Once the preferred option was identified in the development of this strategy, further modelling was undertaken to assess the benefits and impacts that a kitchen waste collection service might have, and understand the impact it would have towards diverting biodegradable waste from landfill. The results of this exercise are presented in the Environmental Report.

A list of assessment criteria was agreed through the early consultation on the scoping stage of the SEA. These have been applied to each scenario in turn, and the primary results are presented in Table 7.2. The assessment evaluates a number of criteria that are categorised as follows:

- Environmental objectives
- Economic objectives
- Social objectives
- Deliverability of scenarios
- Waste hierarchy and policy

Table 7.2 below presents the total assessment score and the ranking of each scenario. The assessment score is the sum of each category score for each scenario. The results are presented in the form of un-weighted and weighted criteria:

- Un-weighted means that all criteria have been given the same importance.
- Weighted means that each criterion has been given a weight depending on its importance at the local level. The weighting was established through the consultation process. Further information is provided in the Environmental Report and the Consultation Report.

Table 7.2 Ranking of he scenarios resulting from the SEA

Scenario	Total assessment score	Ranking (without weightings)	Score with weighting	Ranking weighted
Sc 1- Base Case	10.45	**6**	**40.43**	**7**
Sc 2- MBT-Aerobic	8.32	**8**	**35.72**	**8**
Sc 3- MBT-RDF on-site	7.60	**9**	**32.73**	**9**
Sc 4- MBT-RDF to 3rd party	10.99	**5**	**42.14**	**5**
Sc 5- MBT-AD + Aerobic	11.08	**4**	**47.80**	**2**
Sc 6- AD + Aerobic (RDF onsite)	9.11	**7**	**41.53**	**6**
Sc 7- EfW + electricity	11.88	**3**	**47.73**	**3**
SC8 – EfW + CHP	14.18	**1**	**55.95**	**1**
Sc 9- Gasification	12.00	**2**	**47.54**	**4**

Overall, the un-weighted results show that the scenarios using thermal treatment are scoring the highest (scenarios 7, 8 and 9). The thermal treatment scenarios all perform well overall due to a solid environmental performance, being less expensive than other options and because they offer the highest recovery and BMW diversion levels. After applying the weightings to the scores, scenario 8 is still ranked first, and scenario 5 (MBT – AD + Aerobic) is now second closely followed by scenario 7 (EfW) and scenario 9 (ATT).

Scenario 8 (EfW with CHP) ranks the highest, primarily due to the enhanced environmental performance that CHP provides. Scenario 7 (EfW) and scenario 8 also have a more favourable score for deliverability, when compared to scenario 9 (ATT). The ATT technology scores lower in deliverability due to its lack of provenness and reliability at similar scale within the UK.

It should be noted that the next best scenarios 5 (MBT-AD + Aerobic), 7 (EfW) and 9 (ATT) achieved very similar scores., which demonstrate that the residual waste treatment solution could be delivered by either a thermal option or a biological one and achieve the overarching strategy objectives. Consequently a clear and decisive conclusion regarding which technology is best suited to Lincolnshire will ultimately be driven by the local circumstances and more detailed site-specific assessments.

Overall the MBT scenarios (2, 3, 4, 5 and 6) score lower that the thermal treatment technology scenarios. The best scoring MBT scenario is scenario 5 mainly due to the fact that it has lower environmental impacts and lower costs overall.

Scenario 3 (MBT with RDF onsite) achieved the lowest score due to performing poorly in terms of environmental objectives, recycling and recovery, and cost.

Interestingly, the base case scenario compares more favourably than some of the MBT scenarios (2 and 3) in a number of the assessment criteria, particularly the environmental ones. This is because most of the MBT scenarios still rely on landfill, in addition to the operation of the MBT facility.

These results are further explained in the SEA report.

7.4 Approach to non-municipal waste

The majority of the waste produced within the county consists of industrial and commercial waste, most of which is managed by private waste management businesses. Many of these wastes are subject to differing legislation and therefore require specialist collection and treatment processes. The Partnership authorities have a duty to arrange for the collection of trade waste on request from businesses, however it is subject to a charge. Where trade waste is collected by the authorities, it forms part of the municipal waste arisings and is subject to the biodegradable waste diversion targets. As private sector operators are not subject to the diversion targets, it currently gives them a competitive advantage over the Partnership authorities. Although the Partnership does not currently offer recycling services to commercial waste producers, it actively promotes organisations that do provide these services. The Partnership will be considering the short, medium and long-term options for dealing with commercial/trade waste collected by the waste collection authorities, in particular the potential for commercial waste recycling services.

7.5 Education and communication

A key Partnership objective, which will improve waste prevention and increase recycling and composting rates, is to raise awareness of waste issues and educate the public on sustainable waste management. The Partnership authorities are committed to delivering a joint information and education campaign that will deliver common messages and provide information on how the public can help implement the strategy. In addition the Partnership has developed a Partnership website, which provides a central point for the Partnership authorities and other organisations to promote sustainable waste management and also act as an educational/ consultation resource.

The Partnership views the educational sector as offering major opportunities for the promotion of sustainable waste management. Lincolnshire County Council actively promotes the Schools Waste Action Club (SWAC). This provides an established education programme that offers schools the opportunity to incorporate waste education into the curriculum and cut waste from schools by up to 80%. Trained staff support teachers and help deliver a series of activities to introduce the ideas of reducing, reusing and recycling. The Partnership will continue to support the SWAC programme and the Eco-schools (Green Flag) initiatives, and offer sustainable waste management advice and activities to schools across Lincolnshire.

8 The next steps: Monitoring and implementing the strategy?

To help identify the best option for managing our waste in the future, we have:

- assessed options for residual waste treatment; and
- undertaken a SEA to identify the most environmentally sustainable options for managing Lincolnshire's waste.

However there are further considerations required to ensure the strategy can be implemented successfully.

8.1 Funding and support

As mentioned previously, the costs of waste management are increasing year on year, and combined with the need to adopt more sustainable waste management practices further pressure will be placed on service budgets. While the Partnership authorities would need to continue to fund general service improvements, the funding to deliver future infrastructure development will be of key importance. As part of the procurement process for a new residual waste treatment facility a business case is being developed by the County Council, together with a review of the potential funding options available. To ensure an adequate balance of risk is achieved, the funding may involve private sector sources in combination with other financial support from Government that is specific to delivering improvements in recycling/composting performance and landfill diversion.

8.2 Partnership working

To ensure the Partnership authorities of Lincolnshire continue to improve services and develop efficiencies it is essential that they work together to deliver the strategy. The Partnership has already made significant progress through improving the interface between the waste collection and disposal authorities. Working together enables the collection and disposal requirements to be coordinated to ensure that future collection service provision is provided with adequate treatment and disposal infrastructure.

8.3 Implementing the strategy

The Partnership has made a commitment to implement this strategy and has recognised that significant changes are required over the next 10 years. To deliver these changes an action plan is being prepared by the Partnership which will break down the actions and tasks required to meet Lincolnshire's targets and objectives set in the strategy.

The delivery of tasks within the action plan will need to be monitored and reviewed annually to ensure the Partnership will deliver the targets it sets itself through this strategy. Where significant changes occur, the action plan will be updated accordingly.

The action plan will establish how the strategy will be delivered, considering what will be required by the Partnership in terms of:

- Action required to deliver waste minimisation and further increase recycling and composting,
- Future changes or improvements to collection services (residual waste, dry recycling, garden waste and potential kitchen waste),
- Investments required to deliver future residual waste treatment facility and additional recycling infrastructures.

Appendices

APPENDIX 1: **Legislation review**

APPENDIX 2: **Summary of scoping report consultation replies**

APPENDIX 3: **Public consultation report**

APPENDIX 4: **Glossary of terms**

APPENDIX 1: Legal requirements

This appendix outlines the main legal requirements regarding waste management that the Lincolnshire Waste Partnership either already has met or will need to meet as new legislation and requirements are introduced.

European waste policy and legislation

The European Union has become the major source of environmental legislation and guidance in relation to the management of waste. A number of European Directives have been introduced which aim to increase levels of recycling and recovery, and thus reduce the amount of waste which is land filled, namely:

- Framework Directive on Waste (75/442/EEC)
- Landfill Directive (1999/31/EC)
- Directive on Packaging and Packaging Waste (94/62/EEC)
- Waste Electrical and Electronic Equipment Directive (2002/96/EC)
- End of Life Vehicles Directive (2000/53/EC)
- Ozone Depleting Substances (Regulation 2037/2000)
- Directive on Batteries (2006/66/EC)
- Waste Incineration Directive (2000/76/EC)

Framework Directive on Waste (75/442/EEC)

This Directive established the fundamental principles for waste management in Europe, which must be reflected in National, Regional and Local Strategies. The key principle is:

- **The Waste Hierarchy –** this provides a framework of how sustainability in waste management can be increased progressively. The aim is to move up the waste hierarchy by significantly reducing reliance on landfill to increased recycling, reuse, composting and recovery and ultimately waste reduction. However, the waste hierarchy should be used as a guide rather than being applied rigidly, and a certain amount of flexibility is needed to arrive at the most balanced environmental, social and economic solution, which will inevitably result in a mixed solution.

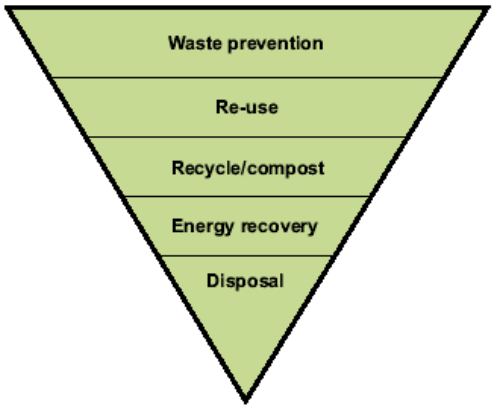


Figure A1-1: The Waste Hierarchy

The requirements of the Framework Directive on Waste were implemented in the UK through the Environmental Protection Act 1990. This legislation defines the different categories of waste and how waste should be managed and controlled. It also defines the duties of Waste Collection and Waste Disposal Authorities, and sets out the Duty of Care applicable to all those handling and disposing of waste, including householders.

The European Commission is developing a Directive on Waste that will succeed the Waste Framework Directive. This new Waste Directive is currently being discussed in the European Parliament, and is expected to:

- Introduce targets to halt the growth in waste generation in Europe at 2008 levels from 2012, with Member States required to draw up national waste prevention programmes.
- Set targets for re-use and recycling, including re-using or recycling 50% of municipal waste by 2020.
- Define when recycled materials or products are no longer deemed to be waste. This would see materials or products that have been fully recycled (perhaps according to a standard) no longer falling under waste legislation.
- Develop efficiency criteria that would enable incinerators to qualify as recovery plants if they meet these criteria.

The European Parliament has also requested the European Commission to develop a Directive on Biowaste (kitchen and garden waste) by June 2008.

The European Commission is also developing a Thematic Strategy on waste prevention and recycling. This will lead to a further reduction in the amount of waste which is landfilled through further recycling and composting, and through an increase in the amount of energy which is recovered from residual waste.

The Commission plans to review the amounts of waste going to landfill in the EU in 2010, and if the move away from landfill is not progressing quickly enough, further landfill bans will be considered.

Landfill Directive (1999/31/EC)

The main aim of the Landfill Directive is to prevent, or minimise the negative effects on both the environment and human health caused by land filling of wastes. It has and will continue to have a significant impact on landfill practices in the UK, as it bans certain materials from being land filled, requires waste to be pre-treated before it is land filled, and requires improvements to landfill management. The introduction of the Directive has resulted in a significant reduction in the number of landfill sites in the UK accepting hazardous wastes. The ban on land filling of certain wastes, such as tyres, from 2006, has meant that new arrangements for their collection and management have been introduced.

Land filled biodegradable waste is a major source of methane, which is a greenhouse gas over 20 times more potent than carbon dioxide in terms of global warming. The Landfill Directive will require the amount of biodegradable municipal solid waste sent to landfill in the UK to be reduced:

- to 75% of 1995 levels by 2010,
- to 50% of 1995 levels by 2013, and
- to 35% of 1995 levels by 2020.

The Government has implemented the requirements for land filling of biodegradable waste through the Waste and Emissions Trading Act 2003. This sets Waste Disposal Authorities (such as Lincolnshire County Council) annual allowances limiting how much biodegradable municipal waste (BMW) can be landfilled in any particular year with effect from April 2005. The Government will fine Authorities that do not achieve their annual targets, but will allow Authorities to buy allowances from other Waste Disposal Authorities if they expect to landfill more than their allocations and sell their surplus if they expect to landfill less than their allowance.

Directive on Packaging and Packaging Waste (94/62/EEC)

The aim of the Directive is to reduce the amount of packaging waste sent for final disposal by introducing recovery and recycling targets for packaging waste. The UK has implemented this Directive through the Producer Responsibility (Packaging Waste) Regulations 1997. The European Commission regularly increases the amounts of packaging waste that need to be recycled. The current target is to recover 60% of all packaging waste by December 31 2008, and meet recycling targets for specific materials, which include a 60% recycling target for both glass and paper/board.

Waste Electrical and Electronic Equipment Directive (2002/96/EC)

The aims of this Directive are to require hazardous components to be removed from waste electrical and electronic equipment (WEEE), and to reduce the amount sent to landfill by introducing recovery and recycling targets. Some types of WEEE items, such as washing machines, are already being recycled, but additional systems for recycling items such as televisions and computers will need to be provided. The UK has implemented this Directive through the Waste Electrical and Electronic Equipment Regulations 2006, and this will require manufacturers to meet the treatment and recycling costs for WEEE items from July 2007.

The European Commission plans to review the existing targets set out by the WEEE Directive in 2008.

End of Life Vehicles Directive (2000/53/EC)

The aims of this Directive are to require hazardous fluids (such as brake fluid) to be removed from end-of-life vehicles (ELVs) and to set recovery and recycling targets. Although ELVs are already being recycled, the Directive will require all ELVs to be treated in authorised treatment facilities (ATFs) and manufacturers will be required to meet the treatment and recycling costs from 2007.

The Department of Trade and Industry introduced the first set of UK ELV regulations in November 2003. These introduced design standards for vehicle manufacturers and environmental standards for the dismantling, recycling and disposal of ELVs by authorised treatment facilities (ATFs). The second set of UK ELV regulations came into force in February 2005, and addresses how manufacturers will set up networks of ATFs to process vehicles at no cost to last owners from 2007.

The current reuse and recycling targets are 80% by 2006 and 85% by 2015. The Commission started a review process of the targets in 2007.

Ozone Depleting Substances (Regulation 2037/2000)

European Council Regulation No. 2037/2000 on substances that deplete the ozone layer came into effect at the end of 2001. The aim of this Regulation is to require the removal of all ozone depleting substances (ODS) (including CFCs and HCFCs) from refrigeration equipment before such appliances are recycled. Ozone depleting substances are present in both the refrigerant liquid and the insulating foam in fridges and freezers, but until this Regulation was introduced, the only requirement was to remove the refrigerant liquid before the appliance was recycled.

Directive on Batteries (2006/66/EC)

A new Directive on batteries was published in September 2006, and Member States, which includes the UK, will have to implement it by September 2008.

The original batteries Directive (91/157/EEC) only covered consumer batteries containing mercury, lead, and cadmium above a certain threshold level. The new Directive will require collection schemes (financed by battery manufacturers) to be set up, and these will need to collect 25% of household batteries by September 2012 and 45% by September 2016. The UK is currently recovering less than 1% of household batteries.

Waste Incineration Directive (2000/76/EC)

This Directive ensures that energy from waste (EfW) incinerators continue to be tightly regulated in terms of their emissions, and sets minimum technical requirements for waste incineration and co-incineration. The Directive applies to all incinerators from the beginning of 2006, and has been implemented in the UK through the present Pollution Prevention and Control (PPC) regime.

UK Waste Policy

Although most waste legislation in the UK has been introduced to meet the requirements set by European Directives, the UK Government has also introduced additional legislation, some of which is specifically aimed at encouraging recycling:

- The Financial Act 1996 and Landfill Tax Regulations 1996
- Waste Minimisation Act 1998
- Animal By-Products Order and Regulations 2003
- Household Waste Recycling Act 2004
- Clean Neighbourhoods and Environment Act 2005
- Local Government Act 1999 – Best Value Regime

The Financial Act 1996 and Landfill Tax Regulations 1996

Landfill Tax is a tax payable for each tonne of waste sent to landfill and was introduced by the Government in 1996 as a way of encouraging more sustainable means of waste management through recognising the hidden financial effects of the environmental impact of landfill. The landfill tax, which was £24/tonne in 2007, had been increasing at a rate of £3 each year, but it was announced in the Budget in March 2007 that the increase would be £8 per year from April 2008 until at least 2010/11, which would result in a level of £48 per tonne in the 2010/11 financial year.

This increase in landfill tax will cause a significant increase in waste disposal costs and will provide a further incentive to move to more sustainable means of waste treatment in the near future.

Waste Minimisation Act 1998

The Waste Minimisation Act enables local authorities to implement schemes to minimise the amount of household waste generated. However, the Act does not place an obligation on authorities to carry out such initiatives, nor does it allow councils to impose any requirements on businesses or households in their area.

Animal By-Products Order and Regulations 2003

As a result of the foot and mouth crisis in the UK, the Government introduced legislation which states that any material that has possibly been contaminated by meat products has to be composted in a suitable composting facility. The regulations also place restrictions on the subsequent use of the compost material (that has been produced by material which has or may have contained meat products) on land where animals (including wild birds) may have access.

Household Waste Recycling Act 2004

The aim of the Act is to increase recycling of household waste by requiring that English waste collection authorities (WCAs) should collect at least two types of recyclable material separately from the remainder of waste. The deadline for implementation is 2010.

Clean Neighbourhoods and Environment Act 2005

The Clean Neighbourhoods and Environment Act deals with many of the problems affecting the quality of our local environment which forms part of a continuum with anti-social behaviour, vandalism, disorder and levels of crime.

The Act provides local authorities, parish and community councils and the Environment Agency with more effective powers and tools to tackle poor environmental quality and anti-social behaviour. In particular the Act includes sections on nuisance and abandoned vehicles, litter, graffiti, waste, noise and dogs. The section on waste covers fly tipping, and enables local authorities to issue fixed penalty notices if waste is left out on the street.

Local Government Act 1999 – Best Value Regime

All Authorities are required under the Local Government Act 1999 to provide “Best Value” services and to secure continuous improvement by regularly reviewing the economics, efficiency, and effectiveness of their functions. Authorities have ‘Best Value Performance Indicators’ (BVPI) for all of their services on which they are required to report annually. The BVPIs include a broad range of waste related measurements for example, the percentage of total household waste recycled. These indicators have since been replaced by National Indicators as defined in The New Performance Framework for Local Authorities & Local Authority Partnerships: Single Set of National Indicators. Department for Communities and Local Government, October 2007.

National Waste Strategy 2007

The Government first published a national waste strategy in 2000. The Prime Minister's Strategy Unit reviewed the progress towards the targets set within Waste Strategy 2000 in 2002. The unit's report suggested that "Waste Strategy 2000" may not be sufficient to move waste onto a more sustainable footing, and the Government established the Waste Implementation Programme to address the recommendations made by the Strategy Unit.

An updated waste strategy for England was published (following consultation during 2006) in May 2007. The aim of this updated Waste Strategy, which sets the Government's vision for sustainable waste management, is to reduce waste by making products with fewer natural resources, and thus breaking the link between economic growth and waste growth. Products should be re-used, their materials recycled, energy from waste recovered, and landfilling of residual waste should occur only where necessary. The key objectives are to:

- Decouple waste growth (in all sectors) from economic growth and put more emphasis on waste prevention and re-use
- Meet and exceed the Landfill Directive diversion targets for biodegradable municipal waste in 2010, 2013 and 2020
- Increase diversion from landfill of non-municipal waste and secure better integration of treatment for municipal and non-municipal waste
- Secure the investment in infrastructure needed to divert waste from landfill and for the management of hazardous waste
- Maximise the environmental benefit from that investment through increased recycling of resources and recovery of energy from residual waste using a mix of technologies.

The main points of the waste strategy are:

- A strong emphasis on waste prevention with householders reducing their waste (for example, through home composting and reducing food waste) and business helping consumers, for example, with less packaging. There will also be a new national target to help measure this.
- More effective incentives for individuals and businesses to recycle waste, leading to at least 40 per cent of household waste recycled or composted by 2010, rising to 45% by 2015 and 50 per cent by 2020. This is a significant increase on the targets (30% by 2010 and 33% by 2015) in the previous waste strategy (which was published in 2000).
- Plastics and aluminium - proposals (subject to further analysis) for higher packaging recycling requirements beyond the 2008 European targets to increase recycling (because of savings in carbon dioxide emissions)
- Increasing the amount of energy produced by a variety of energy from waste schemes, using waste that cannot be reused or recycled. It is expected that from 2020 a quarter of municipal waste - waste collected by local authorities, mainly from households - will produce energy, compared with 10 per cent today.

Other measures include:

- Removing the ban on local authorities introducing household financial incentives for waste prevention and recycling, through early legislative change so that local authorities would have the option to introduce revenue-neutral schemes

(potentially reducing annual residual waste land filled by up to 15% – equivalent to 1.5 million tonnes or 130 kg per household)

- Government will work with the Direct Marketing Association to develop a service so that people will be able to opt-out of receiving un-addressed as well as addressed direct mail. The Government is also considering moving towards an approach where people would only get direct mail if they opted in, by placing their name on the direct mail register.
- Government will work with retailers to reduce the use of free single use bags. This could involve retailers only selling long-life bags, or retailers charging for disposable bags and using the proceeds to sell long-life bags at a discount.
- Recycling extended from the home and office to public areas by providing recycling facilities in shopping malls, train stations and cinema multiplexes, so that recycling becomes a natural part of everyday life.
- Subject to further analysis and consultation, banning biodegradable and recyclable waste from being put into landfill sites.

Regional and local context

The East Midlands Sustainable Development Framework: The Integrated Regional Strategy (IRS) January 2005:

This document sets out the vision for sustainable development in the East Midlands Region. The document identifies priorities for action through the setting of regional objectives and indicators. It also discusses how the region contributes to sustainable development by highlighting the pressure on natural resources, the environment, society, and local economy

Part of the IRS is specifically relevant to waste and the Partnership's strategy will need to consider how it can work towards achieving the Regional objectives and indicators.

East Midlands Regional Waste Strategy (January 2006)

The Regional strategy sets out the principles and priorities for waste management:

- Working towards zero growth in waste at the regional level by 2016;
- Reducing the amount of waste sent to landfill in accordance with the EU Landfill Directive;
- Exceeding Government targets for recycling and composting, with the objective to bring all parts of the region up to the levels of current best practice; and
- Taking a flexible approach to other forms of waste recovery, on the basis that technology in this area is developing very quickly and is difficult to predict over a 20-year period.

It sets 10 broad priority issues for the region from planning waste management infrastructures, promotion and education to change behaviour, increase resource efficiency and reducing commercial waste, procurement and market development, to reducing fly tipping. The Partnership's strategy contributes to meeting the Regional goals and targets.

Regional Spatial Strategy for the East Midlands (March 2005)

The RSS was adopted in March 2005 and sets out broad strategic policies for the spatial development of the region up to 2021. The strategy sets 10 objectives for the Region including identifying the scale and distribution for new housing and priorities for the environment, transport, economic development, minerals, and waste treatment and disposal.

The RSS sets the objectives that have since been encompassed in the regional waste strategy of working toward a zero waste growth by 2016, reducing the amount of waste sent to landfill in accordance with the landfill directive, meeting or bettering government recycling targets.

It also sets a target for all waste collection authorities to achieve a minimum of 50% household waste recycling and composting by 2015.

Regional Environment Strategy

The document contains a key policy on waste management: To promote and support sustainable waste management practices and minimise the impact of waste on the environment

The Partnership's strategy works toward the Regional Environment Strategy's overall policies and objectives help the region to be more sustainable in the way it treats its waste.

Lincolnshire Waste Local Plan (2006)

The Waste Local Plan sets the framework for directing and assessing proposals, which require planning permission and are related to treating or disposing of waste (both commercial and household). The Plan does not, however, deal directly with waste collection, home composting, encouraging, or educating people to reduce their waste, as this is the role of the Municipal Waste Management Strategy. The role of the Plan is to:

- Help set the agenda for waste reduction, re-use and recycling in Lincolnshire;
- Set the framework for the most sustainable approach at the present time, and over the plan period, for dealing with waste in Lincolnshire;
- Provide a land use and development control interpretation of the Municipal Waste Management Strategy for Lincolnshire and the Regional Waste Strategy for the East Midlands;
- Provide the criteria and standards by which planning applications for waste management development can be judged.

Regional Economic Strategy (2006)

The Regional Economic Strategy sets out what are the issues to be addressed to allow the Region to grow to 2020. It set a number of aims some of which are directly linked to resource and waste management such as:

- Developing and enhancing the region's communities and its assets of physical infrastructure and the natural environment to ensure they contribute effectively to the region's productivity and economic well-being, both now, and into the future.
- To transform the way we use resources and use and generate energy to ensure a sustainable economy, a high quality environment and lessen the impact on climate change.

Neighbouring authorities

North Lincolnshire Municipal Waste Management Strategy June 2007

The NLMWMS covers the period 2007 to 2025. The main objectives of the strategy are to:

- Limit the growth in municipal waste arisings through the use of waste reduction and minimisation programmes
- Increase the level of recycling and composting to a minimum of 45% by 2010, and meet any future statutory targets set by the Government
- Treat the remaining residual waste to ensure that North Lincolnshire exceeds yearly UK Government landfill targets between now and 2020
- Provide sufficient future landfill capacity for any waste which is either unsuitable for recycling or treated to recover value from it

Nottinghamshire County Council and Nottingham City Council Municipal Waste Management Strategy

A MWMS was published in 2001 and covers a period of 20 years. The MWMS was intended to:

- Provide a framework for the Councils to plan and manage their waste management services in an integrated way;
- Increase the sustainability of waste management in Nottinghamshire by promoting waste minimisation, and increasing the re-use, recycling and composting of waste; and
- Meet the needs of the residents of Nottinghamshire, be environmentally acceptable and affordable to the Councils.

The Strategy set out three key objectives for municipal waste management in the County over the next 20 years:

- To stabilise (and in due course reduce) the amount of municipal waste generated in Nottinghamshire.
- To achieve the national targets for waste recycling, recovery and disposal of waste to landfill.
- To deliver an affordable and environmentally acceptable waste management service. To implement solutions that have the support of the public

In June 2006 Nottinghamshire County Council signed a 26 years PFI with Veolia to deliver these objectives.

Leicestershire Municipal Waste Management Strategy

In order to reflect the primacy of waste prevention, the Leicestershire authorities will move towards a long-term service design that to really increase and encourage home-composting.

The Leicestershire authorities will take measures to minimize the landfilling of the non-household element of municipal waste, either through continuing to collect such material and managing it in different ways or by reducing collection of it in the first place.

The strategy has targets to achieve recycling and composting rates of:

- 40% of municipal waste by 2007;
- 50% of municipal waste by 2010; and
- 58% of municipal waste by 2017

and targets for residual municipal waste generated per person of:

- 395Kg in 2007
- 325Kg in 2010
- 310Kg in 2015
- 295Kg in 2020

They will aim to achieve self-sufficiency in Landfill Allowances where this represents best value and to minimize the need to have recourse to the LATS**.**

Cambridgeshire and Peterborough Municipal Waste Management Strategy

Their waste strategy is currently under review.

Norfolk Municipal Waste Management Strategy March 2006

The strategy set policies and objectives for Norfolk for the period 2006 to 2020. The key objectives are:

- To reduce the growth in municipal waste by promoting waste reduction and reuse initiatives; to promote waste awareness through public education and awareness campaigns;
- To achieve statutory performance standards and national recycling and recovery standards; and comply with LATS.
- To deliver an efficient, effective and affordable waste management service that promotes the implementation of the most practical, social, environmental and economically acceptable solutions.
- To procure appropriate technologies to manage and treat residual municipal waste; and ensure that residual waste is treated using technologies higher up the waste hierarchy.

APPENDIX 2: Summary of scoping report consultation replies

The first stage of the SEA process was to prepare a Scoping Report. This considered the impact of relevant strategies, plans and programmes, providing background information and outlining the criteria and waste management scenarios to be used for conducting the assessment. It was developed through consultation with statutory bodies, and key local stakeholders. This engagement defined the assessment criteria and proposed targets for waste minimisation, re-use, recycling/composting and recovery of waste. The consultation period was three weeks and the following stakeholders were invited:

- Environment Agency
- English Heritage
- Natural England
- East Midlands Regional Assembly
- Boston Borough Council
- City of Lincoln Council
- East Lindsey District Council
- North Kesteven District Council
- South Holland District Council
- South Kesteven District Council
- West Lindsey District Council
- Lincolnshire County Council Sustainability Officer
- Lincolnshire County Council Waste Planning Authority

Eight replies received from the above organisations, and these are summarised in this appendix.

The replies covered a wide range of aspects and included comments on the criteria that are used within the assessment of the waste treatment options.

Advice was given to consider the potential impacts of the strategy on the historic environment; for example, the choice of methods for waste collection/ recycling services that could affect historic buildings/ areas; potential impacts of development on historic sites/ landscape and townscape.

It was noted that Grantham and Lincoln are two areas that are seeing a noticeable population growth. This will have an impact in the amount of waste arisings in these areas and maybe added pressure to the current waste and recycling services.

A comment was made that as Lincolnshire is a geographic area which is affected by low flying military aircraft, which potentially can be affected by activity that can attract birds (predominantly landfill operations), this specific aspect should be given consideration when assessing the future location and type of treatment facilities.

Criteria and weightings

A number of comments were made on the proposed criteria and weightings such as:

- The list of criteria could include one to determine the benefits in providing any infrastructure for local industry/business to tap into as to potentially recycle their waste.
- The weightings seem appropriate however there could be more emphasis on criteria such as maximising public acceptability, the likelihood of obtaining planning permission, the ease of participation, and Health & Safety implications. The stakeholder considered that public acceptability would be driven by ease with which the public could participate, and therefore this criterion should either be weighted the same, or public participation be set higher then acceptability.
- The need to consider that some factors will have major impact in one area and little in others.
- For the economic criteria there will be a need to assess how many of the created jobs would go to the local population.
- Local transport weighting could have been set higher, and the impact on health reduced: recognising that modern treatment plants are very tightly regulated.
- There is a need to take into consideration the visual impact of the treatment facility that could have serious impact and seriously affect local economy/property values.

Scenarios proposed

The comments received on the technology options proposed in the modelling scenarios, included the need to consider all types of technology at the onset of the project such as autoclaving, pyrolysis and gasification.

It was recommended that an in-vessel composting scenario be included to enable the Partnership to consider in the medium to long term the introduction of cooked and separate uncooked food waste collection as the standard type of composting facility, replacing the current form of windrow composting for just green waste. This, in turn, would allow for greater diversion from landfill.

APPENDIX 3: Public Consultation report

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Outcomes of the consultation

The review of the feedback from the consultation process indicates strong views that the countywide recycling target should be increased. It is now agreed across the Partnership that the target for recycling and composting for the county should be increased from 50% to 55% by 2015. The assumed split is approximately 30% recycling and 25% composting.

The conclusions of the consultation were:

- The Draft Strategy was generally well received.
- Aspirations with respect to recycling and composting were not felt to be ambitious enough in the light of progress in recent years. It has therefore now been proposed that a target of 55% recycling and composting should be set for 2014/15 (compared with 50% in the draft strategy and the East Midlands Regional Waste Strategy).
- With respect to residual waste treatment, the aspiration should be to 'exceed' rather than just 'meet' the LATS targets and to divert the optimum amount of residual waste from landfill.
- The conclusion of the draft SEA that Energy from Waste (EfW) is the preferred form of residual waste treatment for the county was broadly supported.

A number of the overarching objectives of the strategy will be reviewed to incorporate the feedback received, and the SEA will be revised to assess the impact of the higher recycling rates.

Consultation process

As part of the waste strategy and SEA process there is a statutory requirement to undertake public consultation.

It is recommended that the consultation period lasts for 12 weeks, but this is not statutory. The public was consulted on the proposed draft strategy and the draft environmental report, which presents the outcomes of the Strategic Environmental Assessment (SEA).

There are numerous public consultation methods available and each authority is free to choose how their consultation is undertaken.

Lincolnshire consultation method

The Lincolnshire Waste Partnership chose to carry out public consultation between 21 December 2007 and 7 March 2008. The documents made available during the consultation period were:

- The full draft strategy and appendices
- Summary of the strategy objectives
- Draft environmental report and its appendices

The consultation took the following forms:

- Web based consultation documents and questionnaire
- Postal questionnaire
- Workshops
- Roadshows

Web based approach

Local residents and interested parties could access all consultation documents through Lincolnshire County Council's LCC Connects website. In addition a web based questionnaire (the same as the postal questionnaire) and an email account was available for the public to feedback their views on the documents.

In total 82 completed questionnaires were submitted via the internet.

Postal questionnaire

A postal questionnaire was sent to 7,000 households across the county, one thousand per district. The sample population was randomly selected using the Lincolnshire Research Observatory's existing database.

The questionnaire was posted during the week commencing 28 January 2008 and respondents were given three weeks to return the completed document. A copy of the questionnaire and document sent with it can be found in Annex 1.

Roadshows

The Partnership put together a roadshow that toured the county's key towns, to inform local residents about waste management in Lincolnshire and how the key issues are being addressed. It helped emphasise the need for the Council to procure a new residual waste treatment facility to replace landfill.

At the roadshow residents were able to ask questions on all waste and recycling issues. People were given the opportunity to fill in the consultation questionnaire at the time or return it by post. A total of 79 questionnaires were received from the roadshow campaign.

Workshops

Workshops are an excellent way to gather detailed and constructive feedback on the strategy and SEA.

The Partnership decided to run two workshops, one aimed at local stakeholders and a second one aimed at elected members. The two events were run on the 28 and 29 February 2008 at the Olde Barn Hotel in Marston.

The workshops were whole day events, and included presentations by the Partnership on the strategy, and presentations on the SEA and the technologies by AEA.

22 participants attended the stakeholder day and 18 participants attended the elected members day.

The workshops were interactive with participants being encouraged to share their views, as well as undertaking a number of syndicate exercises relating to the strategy objectives and SEA.

Postal questionnaire results

This section presents the results of the postal questionnaires. Overall the number of questionnaires presented for analysis was 1,141, thereby giving statistically robust results.

Looking at the demographic profile of the respondents, 49% were male, 98% of respondents described themselves as white British, a further 1% as white other and just 1% as an ethnic minority. The age groups were all represented at various levels, as expected in a postal survey it is mainly people aged 35+ that are likely to respond (table A3.1).

Table A3.1 Age of respondents

18-24	25-34	35-44	45-54	55-64	65-69	70-74	75+
2%	6%	15%	19%	23%	12%	10%	13%

Question 1

The first question was about the objectives of the strategy. Overwhelmingly more than two thirds of all respondents across the county agreed that the strategy's objectives will help the Partnership manage its waste more sustainably. Table A3.2 presents the details by district. East Lindsey respondents were more likely to strongly agree (31%) rather than Boston respondents (22%).

Table A3.2 Having read the Strategy Objectives, do you agree that they will help the Partnership to manage our waste in a more sustainable manner?

	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
North Kesteven	24%	69%	1%	0%	7%
South Kesteven	30%	66%	1%	1%	3%
South Holland	26%	68%	1%	1%	4%
Boston	22%	65%	3%	1%	9%
Lincoln City	24%	67%	1%	0%	8%
East Lindsey	31%	59%	4%	2%	5%
West Lindsey	22%	72%	1%	0%	5%
Countywide	**26%**	**66%**	**2%**	**1%**	**6%**

Question 2

Respondents were asked if the LWP should aim to reduce the amount of waste produced as much as possible. Overwhelmingly 99% of respondents either strongly agreed or agreed with this statement. The responses are consistent across the districts. Table A3..3 presents the results.

Table A3.3 To what extent do you agree that we should aim to reduce the amount of waste we produce as much as possible?

	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
North Kesteven	73%	24%	1%	0%	1%
South Kesteven	70%	30%	1%	0%	0%
South Holland	72%	26%	1%	0%	1%
Boston	66%	32%	0%	1%	1%
Lincoln City	71%	29%	0%	0%	1%
East Lindsey	78%	22%	0%	0%	0%
West Lindsey	70%	29%	1%	0%	0%
Countywide	**72%**	**27%**	**1%**	**0%**	**0%**

Question 3

We asked respondents how they felt about the new recycling targets proposed by the strategy, i.e. 44% recycling by 2010 and 50% by 2015. The majority, 54% of respondents, said that the targets were about right, and 44% said they were too low. The results are noticeably consistent between the districts.

Table A3.4 Lincolnshire achieved a 40% recycling rate in 2006/07. The Strategy proposes targets of 44% recycling in 2010 and 50% recycling in 2015. Do you think these targets are:

	Too low	About right	Too high
North Kesteven	44%	54%	1%
South Kesteven	41%	58%	1%
South Holland	42%	56%	2%
Boston	41%	55%	3%
Lincoln City	45%	51%	5%
East Lindsey	49%	49%	2%
West Lindsey	43%	56%	1%
Countywide	**44%**	**54%**	**2%**

Question 4

The majority of respondents, 52%, strongly agreed that the Partnership should invest in new waste treatment facilities so as to avoid fines in the future. A further 44% agreed with that statement. The breakdown is presented in Table A3..5.

Table A3.5 To what extent do you agree that we should invest in new waste treatment facilities now to prevent significant fines in the future

	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
North Kesteven	46%	49%	1%	0%	4%
South Kesteven	49%	47%	1%	0%	2%
South Holland	56%	42%	1%	0%	2%
Boston	50%	44%	1%	1%	3%
Lincoln City	50%	46%	1%	0%	2%
East Lindsey	56%	39%	2%	1%	3%
West Lindsey	53%	44%	1%	0%	2%
Countywide	**52%**	**44%**	**1%**	**0%**	**3%**

Question 5

Public education and awareness campaigns are seen as key tools for the Partnership to help achieve its recycling targets and minimise the amount of waste produced. The majority of respondents, 88%, either strongly agreed or agreed that this was true. Again the results are fairly consistent between the districts.

Table A3.6 To what extent do you agree that public education and awareness campaigns will help us meet our objectives?

	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
North Kesteven	34%	57%	3%	1%	6%
South Kesteven	39%	50%	6%	1%	4%
South Holland	39%	48%	4%	2%	7%
Boston	38%	49%	6%	1%	6%
Lincoln City	36%	54%	4%	3%	3%
East Lindsey	33%	53%	8%	1%	6%
West Lindsey	31%	59%	4%	1%	6%
Countywide	**35%**	**53%**	**5%**	**1%**	**6%**

Question 6

Waste is increasingly being seen as a valuable resource. In addition to recycling waste to recover materials for further use, waste has a value in terms of the energy it can release.

The strategy aims to maximise the recovery of the value of its waste through recycling but also by treating residual waste before final disposal

The majority of respondents, 72%, strongly agreed with that view, and a further 27% agreed.

Table A3.7 To what extent do you agree that we should aim to recover as much value, in terms of materials and energy, from our waste as possible?

	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
North Kesteven	71.9%	26.9%	0.0%	0.0%	1.3%
South Kesteven	69.6%	29.7%	0.7%	0.0%	0.0%
South Holland	72.0%	27.4%	0.6%	0.0%	0.0%
Boston	65.0%	33.6%	0.0%	0.7%	0.7%
Lincoln City	72.3%	27.1%	0.0%	0.0%	0.6%
East Lindsey	77.5%	21.3%	1.2%	0.0%	0.0%
West Lindsey	73.9%	25.6%	0.0%	0.0%	0.6%
Countywide	**71.7%**	**27.4%**	**0.4%**	**0.1%**	**0.4%**

Question 7

The last question focused on asking respondents to rank in order of priority what should be the priority issues in the decision making process to identify alternatives to landfill. The ranking was 1 to 6 where 1 is the most important and 6 the least important.

According to respondents the most important issue that should be driving the decision making process about new waste treatment facilities should be its environmental impact, 45% of respondents giving it a score of 1, and 82% giving it a ranking between 1 and 3.

The impact on the local community was scored the second highest priority with a total of 75% of respondents ranking this issue between 1 and 3, followed thirdly by cost with 59% of respondents ranking it between 1 and 3. Proven reliability of the method was given a ranking of between 1 and 3 by 58% of respondents.

It appears that "opportunities for public involvement" was the least important area with just 21% of respondents ranking this between 1 and 3.

Table A3.8 We are committed to maximising recycling and composting, but will still need to choose an alternative to landfill to treat the remaining waste. In making our decision, how do you feel we should prioritise the following issues? Please rank from 1 to 6 with 1 being most important and 6 being the least important.

	Environmental Impact	Impact on the local community	Cost	Opportunities for public involvement and education	Proven reliability of treatment method	Other
1	**45%**	15%	17%	3%	16%	4%
2	21%	**30%**	20%	7%	**21%**	1%
3	15%	**30%**	21%	12%	**21%**	1%
4	12%	18%	**25%**	20%	24%	1%
5	5%	6%	14%	**55%**	16%	3%
6	2%	1%	3%	3%	1%	90%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Conclusion

The results of the questionnaire show a broad acceptance of the new strategy.

The objectives of the strategy have been accepted as being a good basis for helping the Partnership deliver more sustainable waste management services in the county.

Respondents were positive about all the statements and agreed that the Partnership needs to reduce the amount of waste produced, and encourage the public through education and awareness campaigns to do more recycling and help minimise waste. It was also considered important that the Partnership maximises the value recovered from waste.

In term of alternatives to landfill, respondents were keen that the decision process should be governed by the environmental impact, the impact a new facility would have on the local communities and on cost.. This is compatible with the weightings agreed through the workshops to be used in the criteria assessment to identify a preferred residual waste treatment option.

Workshops

The first workshop took place on 28 February 2008 and was for stakeholders, the second workshop was held on the 29 February 2008 and was for local elected members.

The aim of the workshops was to provide delegates with the opportunity to learn more about the draft waste strategy, to ask questions or clarification and to offer views on aspects of the plan.

Representatives from the Lincolnshire Waste Partnership and consultants, AEA Technology, attended to give presentations and to help with technical aspects of the discussion.

The session was facilitated by Peter Woodward and Jane Lloyd of Quest Associates, who are experienced independent facilitators.

The workshops took place in Lincolnshire at the Olde Barn Hotel, Marston. For workshop 1 (stakeholders) participants were sat around tables in groups of six and were asked to sit with people they did not know wherever possible. For workshop 2 (elected members) we asked representatives of each authority to sit together as for some of the exercises an authority rather than an individual view was required.

This section features the outcomes from the sessions

First session: Strategy objectives

The first part of the day was focused on the overarching objectives of the strategy. We addressed objectives in pairs in the order of the strategy. For each objective a short presentation took place followed by clarifications and discussion. Participants were then asked to discuss the objectives amongst themselves and feedback to the group afterwards.

On a number of occasions participants were asked to contribute by using stickers on boards. Pictures of the exercises have been included where relevant.

The following tables present the summary of comments for each objective.

Objective 1:

To prevent the growth in municipal waste by promoting waste reduction and reuse initiatives

Workshop 1	Workshop 2
This was felt to be a key objective, which will require working/ engaging with local and national retailers on issues such as packaging. This will require all seven districts to provide a more harmonious service to local residents. There is the issue of commercial and trade waste and the need to ensure that businesses as well as residents are engaged in this process. This objective is closely linked to objective 2.	The focus of the discussion was around whether the Partnership should set a waste minimisation target and if so at what level. The discussion then revolved around how waste minimisation can be measured.

Objective 2:

To promote waste awareness through co-ordinated public education and awareness campaigns, and effective community engagement

Workshop 1

Participants agreed with the objective.

The comments were around:

- The need to harmonise the message across the county
- How this will be measured
- The need to work with schools but also retailers

Workshop 2

Generally there were few comments on this objective. Some participants would like the objective to include the use of enforcement if necessary.

Objective 3:

Across Lincolnshire to achieve 44% recycling and composting by 2010 and 50% by 2015

Workshop 1

There was a split between the participants:

Those that agreed the targets were realistic and achievable. That there is a need to consider that in the last 2 years the county has done extremely well to increase its recycling, but higher recycling rates will become harder and more expensive to achieve.

Those that thought the targets were un-ambitious, and too easy. There was a call for a 55% or 60% recycling rate for 2015.

Workshop 2

Participants again were divided between thinking the targets were realistic and achievable, and those who wanted more ambitious targets.

The comments also included the issue of political willingness, the need for additional funding in some of the districts, the fact that some districts have recently heavily invested in their recycling collection and so could not foresee more funding in near future, thus the targets would need to be achieved with current services.

For Objective 3 delegates were also invited to indicate with two sticky dots what they thought the recycling target for 2010 and 2015 should be (see photos).

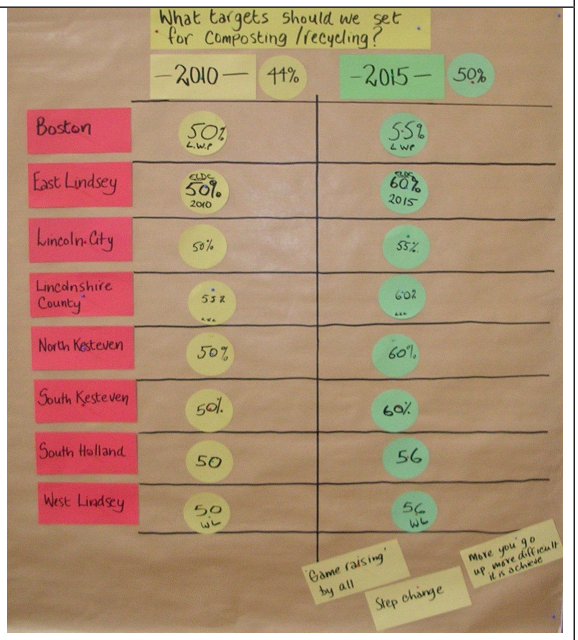
Stakeholder workshop	Elected Members Workshop
	

Figure A3-1 What recycling levels should the Partnership set itself?

Objective 4:

Across Lincolnshire to achieve a uniform dry recyclables waste stream

Workshop 1

Generally participants agreed that this would have many benefits.

It was identified though that there are different political agendas and that these might be hard to overcome.

There is also the need to consider end markets and that currently districts are responsible for where their recycling is sent which influences what they collect.

Discussion around kitchen waste collections.

Issues around exporting waste and moving it long distances, acknowledging that this is influenced by the reprocessing markets which are now global.

Workshop 2

Generally participants agreed that this would have many benefits, but wanted to see a list of what materials have to be collected with targets dates for some materials like batteries for example.

Should we consider kitchen waste? If so should it be implemented by all districts?

.

Overall agreement that further consideration should be given to this in the medium term.

Objective 5:

To progressively increase the recovery and diversion of bio-degradable waste from landfill to meet and exceed the Landfill Directive diversion targets

Workshop 1	Workshop 2
Overall participants agreed with the objective.	Overall agreement.
There is a need to understand by how much LATS should be exceeded.	Lincolnshire should be leading by example in tackling climate change, and diverting waste from landfill is key.
LATS is a driver but landfill is also becoming more expensive every year.	General agreement that the Partnership should aim to exceed rather than just meet LATS. Need some security in case recycling rates are not achieved or if waste growth is higher than that predicted.
	Need to consider the issue and potential fines linked to the current landfill contracts.

Objective 6:

To ensure that residual waste treatment supports practices higher up the waste hierarchy

Workshop 1	Workshop 2
General agreement for this objective.	General agreement, but participants would like to see some clarification in the wording of this objective.

Objective 7:

To deliver better value for money services addressed on a countywide basis

Workshop 1	Workshop 2
Generally agreed with the objective, but did not like the wording. The word better needed to be replaced.	Generally agreed with the objective, would like the word better changed to best.
Issue discussed around how to measure this.	Need to take into consideration the impact on the districts and the county.
Comments around the power of the Partnership brand, which is not widely known.	

Objective 8:

To consider approaches to managing waste from commercial and industrial sources

Workshop 1	Workshop 2
This objective needs to be reworded to reflect actions that will be taken.	Agreed with the objective, again the wording needs to be amended.
There is a need to address commercial and industrial waste and encourage more recycling.	There is a gap in the market for SME and the Partnership should provide them with recycling services.
	Need to consider the end market for recyclate.
	Need to clarify what type of waste is referred to (i.e. not hazardous).

Objective 9:

To lobby and work with others on waste management issues

Workshop 1	Workshop 2
Generally agreed, but the objective needs to be more focused. Who will the Partnership lobby and how.	Generally agreed, need to amend the wording to "lobby, work and cooperate with…."
	There is a need for a more integrated thinking and influencing through planning. For example, new housing schemes and industrial parks should be made to include recycling facilities

Objective 10:

As Local Authorities to set an example by preventing, reusing, recycling and composting own waste and using our buying power to positively encourage sustainable resource use

Workshop 1	Workshop 2
Agreed and saw this as a key objective. The Partnership needs to be seen as leading by example	No comments, agreed
All local authorities should influence this through an extensive green procurement policy	

Workshop 2 only:

After discussion of each Objective, each district was invited to indicate whether it would support the Objective, by placing a tick in the matrix. A large 'C' indicates a significant comment to be considered in the strategy re-draft. A small 'C' indicates a less significant, but nevertheless important comment (see photo below).

Figure A3-2 Do we agree with the Strategy's objectives?

Second session: Strategic Environmental Assessment

This session presented the aims and objectives of the SEA, and why it was required. It presented the scenarios that have been considered to treat residual waste and how we assess the impacts, in term of environmental factors, socio-demographic factors, deliverability of technology, and waste policy factors.

The weighting of criteria is very important, as it will be applied to the SEA results for the final scoring of options.

Weighting the criteria

Delegates were invited to give relative weightings to the 14 criteria used in the SEA to assess the scenarios, by placing 25 dots on the following grid:

		Criteria	4%	8%	12%	16%	20%
Environmental factors	1	Minimise nuisance from noise, odour, dust, litter and vermin generation					
	2	Minimise local transport movements					
	3	Minimise local health impact from waste treatment technologies					
	4	Minimise impact to soil and water and air quality					
	5	Help tackle climate change by minimising greenhouse gas emissions					
	6	Minimise visual impact					
	7	Maximise resource efficiency (land, water and other resources)					
Economic factors	8	Minimise costs of waste management					
	9	Maximise economic and social benefits					
Deliverability	10	Minimise risks through ensuring maturity and flexibility of technology					
	11	Maximise public acceptability and likelihood of obtaining planning permission					
	12	Ease of public participation and health and safety implications					
Waste hierarchy and policy	13	Meet targets for reduction, recycling/composting and recovery					
	14	Meet government targets set for diverting biodegradable waste from landfill					

All the outcomes from the exercise were put together and an average relative weighting was calculated. In workshop 2 all delegates were asked to first weigh the criteria as an individual who lives/works in Lincolnshire. They were then asked to agree one weight per criterion by districts. The results are presented in Table A3.9 and Figure A3.1

Table A3.9 Weight given

			Stake-holders	Elected Members as individuals	Districts	**AVERAGE weight**
Environmental factors	1	Minimise nuisance from noise, odour, dust, litter and vermin generation	6.40%	8.00%	9.00%	**7.80%**
	2	Minimise local transport movements	6.40%	7.56%	9.50%	**7.82%**
	3	Minimise local health impact from waste treatment technologies	6.60%	7.33%	6.50%	**6.81%**
	4	Minimise impact to soil and water and air quality	7.20%	4.89%	4.00%	**5.36%**
	5	Help tackle climate change by minimising greenhouse gas emissions	10.80%	10.00%	8.50%	**9.77%**
	6	Minimise visual impact	2.60%	3.33%	2.50%	**2.81%**
	7	Maximise resource efficiency (land, water and other resources)	6.20%	4.00%	3.50%	**4.57%**
Economic factors	8	Minimise costs of waste management	7.00%	9.33%	9.50%	**8.61%**
	9	Maximise economic and social benefits	5.60%	6.89%	6.50%	**6.33%**
Deliverability	10	Minimise risks through ensuring maturity and flexibility of technology	8.40%	4.00%	4.50%	**5.63%**
	11	Maximise public acceptability and likelihood of obtaining planning permission	6.20%	7.78%	6.50%	**6.83%**
	12	Ease of public participation and health and safety implications	4.80%	4.89%	6.00%	**5.23%**
Waste hierarchy and policy	13	Meet targets for reduction, recycling/composting and recovery	10.60%	11.11%	10.50%	**10.74%**
	14	Meet government targets set for diverting biodegradable waste from landfill	11.20%	10.89%	13.00%	**11.70%**
		TOTAL	100.00%	100.00%	100.00%	**100.00%**

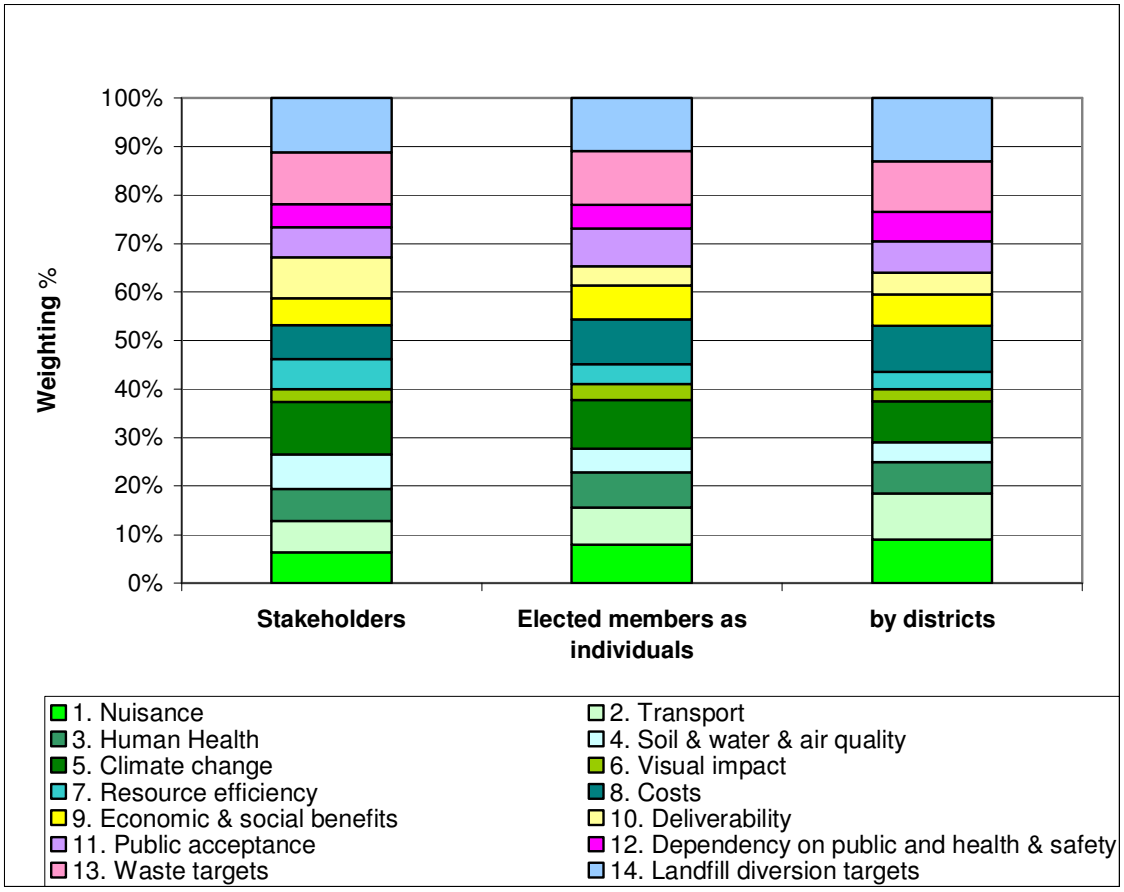


Figure A3-3 Weights comparisons

Session 3: Residual treatment options

The last session of the day featured a non-technical presentation of the technologies the SEA considered for treating residual waste.

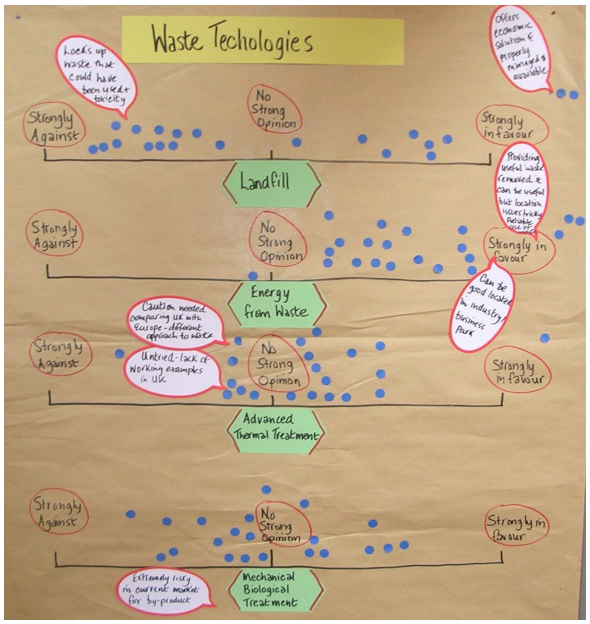
Delegates were able to ask questions for clarification and then discussed the options amongst themselves. Delegates were then invited to indicate their views on the four main residual treatment technologies as shown below.

It can be seen that in both workshops incineration with energy recovery was the most favoured technology to treat the residual waste. It was generally agreed that there will always be a need for landfilling. The elected members were much more confident in their choice than the stakeholders.

The comments on gasification (advanced thermal technology) were that it was an interesting technology but that there is a distinct lack of confidence in whether it can be delivered.

The MBT technology received a more cautious ranking, elected members were concerned that it might not deliver sufficient waste diversion to meet LATS in the longer term.

Stakeholders



Elected members

Figure A3-4 Which residual treatment technologies?

Final views

The final comments and views were that delegates agreed with the overall strategy but that the wording of some objectives needed to be amended.

The recycling targets have been reviewed and are now set at 55% for 2015.

In terms of technology option, there was a clear agreement in both workshops that Energy from Waste (EfW) was the preferred option to treat residual waste in Lincolnshire.

The weightings set for the criteria have been averaged and will be fed into the SEA.

Annex 1:
Feedback questionnaire and document sent by post

Joint Municipal Waste Strategy for Lincolnshire

PUBLIC CONSULTATION SURVEY

The Lincolnshire Waste Partnership
December 2007

Boston Borough Council
East Lindsey District Council
Environment Agency
City of Lincoln Council
Lincolnshire County Council
North Kesteven District Council
South Kesteven District Council
South Holland District Council
West Lindsey District Council

What is the Joint Municipal Waste Strategy for Lincolnshire?

The County Council, the seven District Councils and the Environment Agency have formed the Lincolnshire Waste Partnership and our aim is to deliver sustainable waste management services to the community.

How the Partnership plans to achieve this vision is set out in the draft waste strategy which is based on the following objectives:

Objective 1	To prevent the growth in municipal waste by promoting waste reduction and reuse initiatives
Objective 2	To promote waste awareness through co-ordinated public education and awareness campaigns, and effective community engagement
Objective 3	Across Lincolnshire, to achieve 44% recycling and composting by 2010 and 50% by 2015
Objective 4	Across Lincolnshire to achieve a uniform dry recyclables waste stream
Objective 5	To progressively increase the recovery and diversion of biodegradable waste from landfill to meet and exceed the Landfill Directive diversion targets
Objective 6	To ensure that residual waste treatment supports practices higher up the waste hierarchy
Objective 7	To deliver better value for money services addressed on a countywide basis
Objective 8	To consider approaches to managing waste from commercial and industrial sources
Objective 9	To lobby and work with others on waste management issues
Objective 10	As Local Authorities to set an example by preventing, reusing, recycling and composting our own waste and using our buying power to positively encourage sustainable resource use

Where are we today?

In Lincolnshire we produce around 360,000 tonnes of municipal waste each year, and it's growing annually by about 1.7%. Last year we recycled and composted 40% of our waste, with the remaining 60% being sent to landfill. However, waste management in the county now needs to change to meet new national and European laws.

Some of the main challenges are to:

- Reduce the amount of waste we produce to stop the 1.7% annual growth rate
- Increase recycling, composting and energy recovery
- Divert waste away from landfill to new treatment facilities

The Partnership aims to deliver these objectives by:

- Delivering a long term education and awareness campaign to help reduce waste and increase recycling and composting
- Providing a greater commonality of waste management services across Lincolnshire
- Providing a new residual waste treatment facility to reduce the amount of biodegradable waste being sent to landfill

Are waste reduction and recycling still important?

Reducing the amount of waste we produce is very important and is the first step we will be taking. Recycling and composting are also vital to our strategy, and we are aiming to boost recycling rates to 44% by 2010 and 50% by 2015.

However, there will still be a large amount of waste to dispose of after recycling and composting have taken place.

Why can't we continue to landfill our rubbish?

Landfill is the least environmentally friendly way of dealing with our rubbish. Over time it breaks down releasing polluted liquid and gases that contribute to global warming.

Since 2005 the amount of waste we can send to landfill has been set by the Government. This quantity is being significantly reduced each year. If we exceed this limit we will have to pay a fine of £150 per tonne for each tonne landfilled over our allowance. This could lead to the County Council being fined millions of pounds each year.

To prevent these fines we need to invest in new residual waste treatment facilities now so that we can stop sending so much waste to landfill.

How do we choose the right residual waste treatment method?

There are a number of different technologies that can be used to treat residual waste. The waste strategy has looked at nine different options. These options have been assessed against a wide range of factors including reliability, flexibility, environmental impact, impact on the local community, cost, and opportunities for public involvement and education.

The assessment indicates that the highest scoring options involve thermal treatment. The most common option of this type is Energy from Waste which involves thermally treating the waste to recover energy and generate electricity for use in the National Grid. However, although scoring less well the other types of technology considered may also offer a possible solution.

How can I get involved?

A public consultation exercise is now underway seeking your views on the draft waste strategy. Please take a few minutes to share your views by completing our survey.

Your views will help us to confirm our objectives, and help us choose the right residual treatment solution for Lincolnshire.

Please return in the pre-paid envelope by **Friday 22 February 2008**.

Waste Strategy Consultation Survey

1. **Having read the Strategy Objectives, do you agree that they will help the Partnership to manage our waste in a more sustainable manner?**

(Please tick one box)

Strongly Agree	Agree	Disagree	Strongly Disagree	Don't know
☐	☐	☐	☐	☐

2. To what extent do you agree that we should aim to reduce the amount of waste we produce as much as possible?

Strongly Agree	Agree	Disagree	Strongly Disagree	Don't know
☐	☐	☐	☐	☐

3. Lincolnshire achieved a 40% recycling rate in 2006/07. The Strategy proposes targets of 44% recycling in 2010 and 50% recycling in 2015. Do you think these targets are:-

Too low	About right	Too high
☐	☐	☐

4. To what extent do you agree that we should invest in new waste treatment facilities now to prevent significant fines in the future?

Strongly Agree	Agree	Disagree	Strongly Disagree	Don't know
☐	☐	☐	☐	☐

5. To what extent do you agree that public education and awareness campaigns will help us meet our objectives?

Strongly Agree	Agree	Disagree	Strongly Disagree	Don't know
☐	☐	☐	☐	☐

6. To what extent do you agree that we should aim to recover as much value, in terms of materials and energy, from our waste as possible?

Strongly Agree	Agree	Disagree	Strongly Disagree	Don't know
☐	☐	☐	☐	☐

7. We are committed to maximising recycling and composting, but will still need to choose an alternative to landfill to treat the remaining waste. In making our decision, how do you feel we should prioritise the following issues?

Please rank from 1 to 6 with 1 being the most important and 6 the least important. Please use each number only once.

Environmental impact	
Impact on the local community	
Cost	
Opportunities for public involvement and education	
Proven reliability of the treatment method	
Other	

If other please specify

8. Please enter your postcode:

Personal Details (Optional)

1. Are you male or female?

Male ☐ Female ☐

2. What was your age on your last birthday?

18-24	☐	55-64	☐
25-34	☐	65-69	☐
35-44	☐	70-74	☐
45-54	☐	75+	☐

3. Do you have any longstanding illness, disability or infirmity? (Longstanding means anything that has troubled you over a period of time or that is likely to affect you over a period of time.

Yes ☐ No ☐

4. To which of these groups do you consider you belong?

White		**Black or Black British**	
British	☐	Caribbean	☐
Irish	☐	African	☐
Other white background	☐	Other black background	☐

Mixed		**Asian**	
White & Black Caribbean	☐	Indian	☐
White & Black African	☐	Pakistani	☐
White & Asian	☐	Bangladeshi	☐
Other mixed background	☐	Other Asian background	☐

Black or Black British		**Chinese & Other Ethnic Groups**	
Caribbean	☐	Chinese	☐
African	☐	Other Ethnic Group	☐
Other white background	☐		

If other please specify ☐

APPENDIX 4: Glossary of terms

AD	Anaerobic Digestion
ATT	Advanced Thermal Treatment (gasification/pyrolysis)
BMW	Biodegradable Municipal Waste
BPEO	Best Practicable Environmental Option
CHP	Combined Heat & Power
EfW	Energy from Waste
IVC	In-vessel composting
JMWMS	Joint Municipal Waste Management Strategy
LATS	Landfill Allowance Trading Scheme
LWP	Lincolnshire Waste Partnership
MBT	Mechanical Biological Treatment
MSW	Municipal Solid Waste
MWMS	Municipal Waste Management Strategy
RDF	Refuse Derived Fuel
SEA	Strategic Environmental Assessment
WCA	Waste Collection Authority
WDA	Waste Disposal Authority
WPA	Waste Planning Authority

AEA Energy & Environment
From the AEA group

Strategic Environmental Assessment of Lincolnshire Waste Partnership's Waste Strategy – Environmental Report

Final version

Report to Lincolnshire County Council

Restricted Commercial

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	Date	16th May 2008

Executive summary

AEA Energy & Environment has been commissioned to revise and update the Lincolnshire Waste Partnership's Joint Municipal Waste Strategy (JMWS), including undertaking a Strategic Environmental Assessment (SEA) of the Waste Strategy in accordance with the Environmental Assessment of Plans and Programmes Regulations 2004.

The SEA is being conducted using the SEA guidance provided by the Government. However, we recognise that the SEA process, as it relates to Waste Strategies, is still in its infancy and as a result an innovative methodology needs to be developed.

Why do we need a SEA?

This Environmental Report has been produced as part of the SEA process and presents the assessment of the impact of Lincolnshire Waste Partnership's Joint Municipal Waste Strategy on the environment, economy and health of Lincolnshire. The Waste Strategy will determine the direction the Partnership will take for dealing with the county's waste up to and beyond 2020.

Structure of the SEA

The first stage of the SEA process was to prepare a Scoping Report. This considered the impact of other relevant strategies, plans and programmes, providing background information and outlining the criteria and waste management scenarios to be used for conducting the assessment. It was developed through consultation with statutory bodies, and key local stakeholders. This consultation defined the assessment criteria and proposed targets for waste minimisation, re-use, recycling/composting and recovery of waste.

This Environmental Report represents the second stage of the SEA process. A range of waste management scenarios was modelled and the relative impact of each scenario evaluated against each of the 28 criteria identified. Additionally, the Environmental Report assesses the significance and compatibility of all criteria, and the sensitivity of certain key factors on the overall outcomes.

The third stage of the SEA process involved a twelve-week public consultation exercise on the draft Environmental Report that sought the public's views on services, waste treatment technologies and the importance assigned to each of the assessment criteria. Once the public consultation completed the outcomes of the exercise were feed into the SEA, and the Environmental Report has been finalised.

General conclusions

It should be emphasised that the purpose of the SEA is not to promote the best solution for delivering the waste strategy; instead the assessment methodology applied through the SEA enables the benefits and impacts to be identified for each scenario. In identifying its preferred waste management system, the Partnership will need to consider these different aspects and will have to agree inevitable 'trade-offs' to select the most suitable scenario for Lincolnshire.

Conclusions specific to modelling of the integrated waste management scenarios.

The following table presents the different scenarios that were modelled:

Table 1.1: Residual waste treatment scenarios

Scenario		
Scenario 1	Baseline	100% of residual waste to landfill
Scenario 2	Mechanical Biological Treatment with aerobic stabilisation phase	MBT with an aerobic stabilisation phase, the output is landfilled
Scenario 3	Mechanical Biological Treatment with Refuse Derived Fuel combusted on site	MBT with the output used as a refuse derived fuel (RDF) on site in a small scale energy to waste plant
Scenario 4	Mechanical Biological Treatment with Refuse Derived Fuel to a 3rd party	MBT with the RDF being sold to 3rd party such as cement kiln
Scenario 5	Mechanical Biological Treatment with anaerobic digestion and aerobic stabilisation phase	MBT with anaerobic digestion and aerobic stabilisation phases. The outputs are a compost product (which might be used in landfill engineering) and a biogas
Scenario 6	Mechanical Biological Treatment with anaerobic digestion and Refuse Derived Fuel combusted on site	MBT with anaerobic digestion and aerobic stabilisation phases. There are two outputs, a stabilised output which is landfilled and a RDF which is used on site
Scenario 7	Energy from Waste + Electricity	Energy from waste with electricity generation
Scenario 8	Energy from Waste + Combined Heat and Power	Energy from waste with electricity and heat generation
Scenario 9	Gasification	Advanced thermal treatment (ATT)

The modelling was conducted applying the following assumptions:

- The reduced waste growth rates for municipal waste (shown in Section 2.2) are achieved.
- The recycling targets set in the waste strategy for household waste are achieved
- The landfill diversion targets are met.
- The residual waste treatment facility accepts over 60% of the household residual waste, 30% of residual waste from Household Waste Recycling Centres and all co-collected commercial residual waste.
- The annual capacity for the residual waste treatment facility is set at a maximum of 150,000 tonnes, enough to exceed the landfill diversion targets, but not to treat all residual waste arisings.
- Current landfill contractual obligations are fulfilled.

Table 1.2 below presents the ranking of each scenario before and after the criteria assessment scores have been weighted.

Scenarios 7 (EfW) and 8 (EfW with CHP) perform well. They score highly in environmental terms, and also highly against the waste hierarchy and policy criteria. This is because the technology provides energy recovery and produces minimal amounts of reject material requiring landfill disposal. The combination of these factors allows both scenarios to score well against the environmental criteria, particularly on a number of the WRATE[1] assessed criteria. These options also perform well in economic terms, being the second and third least expensive options after scenario 9 (ATT) scenario. On the other hand, the thermal treatment scenarios score lower in terms of:

- Water usage, due to the high use of water for flue gas cleaning and in the steam raising plant, and
- Amount of hazardous waste produced as fly ash, which requires specialist treatment or disposal.

The other thermal treatment scenario 9 (ATT) scores the second highest and is the least expensive option. However, the ATT process has a very limited track record in processing municipal waste and consequently the costs are difficult to accurately predict. Additionally, as there are currently no large-scale commercial plants in operation in the UK, this will impact substantially on the bankability of the technology. It should also be noted that the costs provided within this SEA are indicative and for comparison purposes only. It is only through a procurement exercise that actual costs can be determined. In conclusion, although the ATT scenario performs well, it may not be acceptable to the Partnership due to uncertainty over its long-term performance and deliverability issues.

The conclusion on the biological treatment (MBT) based scenarios is that scenarios 4 and 5 score better than the rest. Scenario 5, MBT with anaerobic digestion and aerobic stabilisation, as the highest score of all MBT based scenarios because of the higher recycling rate it achieved and its overall lower cost. Scenario 5 is rank second overall after scenario 8.

Scenario 4, MBT with RDF to 3rd party, scores well in terms of the waste hierarchy and policy requirements. Nevertheless, it has the highest transport impact due to the ongoing need to transport reject material to landfill and the transport of RDF to a different facility.

All the MBT scenarios score poorly in terms of transport impact due to the large quantities of material that, once processed, need further onward transportation either to landfill or other treatment sites. The MBT processing operation also has the highest potential to generate noise, odour and dust. The higher quantities of Compost Like Output (CLO) that are produced could impact on water quality when leachate from the compost product is generated in the landfill site. However, the scenarios score well in the prudent use of water.

The Base Case scenario (100% landfill) scores well in terms of minimising the potential for nuisance from noise, odour and dust, because no processing plant is required; processing waste will generate noise, odour and dust. Furthermore, as this scenario does not require treatment of the residual waste, criteria such as land take and water use also score well. However, the scenario performs very poorly in all the waste hierarchy and policy requirements due to the reliance on landfill as a disposal route. The Base Case scores poorly in terms of minimising greenhouse gas emissions due to both landfilling of biodegradable waste (which will generate methane) and a lower level of energy recovery than most of the other scenarios. This means that there is a higher level of resource depletion, as the energy produced by other treatment methods can be off-set against the use of fossil fuels. The scenario also scores poorly in economic terms, due to the smaller workforce required.

1 WRATE: Waste and Resource Assessment Tool for the Environment software which replaced WISARD software in 2007

Scenario 3, MBT – RDF on site scores lowest of all, mainly due to poor environmental performance and is considerably more expensive than all the other scenarios because an on-site RDF combustion facility is required. On the other hand, it scores well in certain objectives because of both the amount of energy recovered and the number of jobs created through the extra facility required to burn the RDF onsite.

Table 1.2: Ranked scenarios

Scenario	Total assessment score	Ranking (without weightings)	Score with weighting	Ranking weighted
Sc 1- Base Case	10.45	**6**	40.43	**7**
Sc 2- MBT-Aerobic	8.32	**8**	35.72	**8**
Sc 3- MBT-RDF on-site	7.60	**9**	32.73	**9**
Sc 4- MBT-RDF to 3rd party	10.99	**5**	42.14	**5**
Sc 5- MBT-AD+Aerobic	11.08	**4**	47.80	**2**
Sc 6- AD+Aerobic (RDF onsite)	9.11	**7**	41.53	**6**
Sc 7- EfW + electricity	11.88	**3**	47.73	**3**
SC8 – EfW + CHP	14.18	**1**	55.95	**1**
Sc 9- Gasification	12.00	**2**	47.54	**4**

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GLOSSARY OF TERMS

AD	Anaerobic Digestion
ATT	Advanced Thermal Treatment (gasification/pyrolysis)
BMW	Biodegradable Municipal Waste
BPEO	Best Practicable Environmental Option
CHP	Combined Heat & Power
EfW	Energy from Waste
IVC	In-vessel composting
JMWMS	Joint Municipal Waste Management Strategy
LATS	Landfill Allowance Trading Scheme
LASU	(Defra) Local Authority Support Unit
LDD	Local Development Document
LDF	Local Development Framework
LWP	Lincolnshire Waste Partnership
MBT	Mechanical Biological Treatment
MSW	Municipal Solid Waste
MWMS	Municipal Waste Management Strategy
ODS	Ozone Depleting Substances
PPS10	Planning Policy Statement 10
RDF	Refuse Derived Fuel
ROCs	Renewables Obligation Certificates
RSS	Regional Spatial Strategy
SEA	Strategic Environmental Assessment
WCA	Waste Collection Authority
WDA	Waste Disposal Authority
WPA	Waste Planning Authority

1 Introduction

1.1 Background to Lincolnshire's Joint Municipal Waste Strategy

The Lincolnshire Waste Partnership (LWP) consists of eight partnering local authorities: Boston Borough Council, City of Lincoln Council, East Lindsey District Council, Lincolnshire County Council, North Kesteven District Council, South Holland District Council, South Kesteven District Council and West Lindsey District Council, and the Environment Agency.

The Partnership has been proactive over the last seven years in developing a joint municipal waste management strategy and commissioning additional research on the issues around waste management and technology options available to treat residual waste. Since its first Joint Municipal Waste Management Strategy (JMWMS) was developed in 2002, the objectives of the Partnership have moved on, driven by new legislation and mandatory requirements surrounding how waste should be managed. In addition, the Environmental Assessment of Plans and Programmes Regulations 2004 introduced a requirement for a Strategic Environmental Assessment (SEA) to be produced for a number of statutory documents including Municipal Waste Management Strategies (MWMS). As the Partnership is revising its JMWMS there is a statutory requirement to undertake an SEA on this document.

However, given that a substantial degree of work and consultation has been carried out through the development of past waste strategies, the process of updating and refreshing the existing strategy and the use of the SEA procedure will assist the Partnership in providing a validation process to past decisions.

The following provides a brief summary of how the JMWMS has evolved since 2002 and explains where we are now.

Municipal Waste Strategy for Lincolnshire 2002

This was the first major waste management strategy developed by the Partnership and sets targets for recycling and composting. The strategy aimed to develop a strategic framework of waste management options and solutions which could be implemented in such a manner that would ensure Lincolnshire County Council and all seven District Councils achieve the targets set by the UK Government and comply with National and European legislation. The strategy incorporated an options assessment, which was completed as follows:

> Sustainability objectives and indicators were developed that broadly (applying DETR methodology at the time) considered three indicator categories: cost, planning and environmental related criteria. An evaluation of each option was undertaken by applying a common scoring system on a scale of 0 to 1. Weightings were applied to each criterion in consultation with District, County and Environment Agency Officers. At the end of that process, an option based around the development of treatment and disposal infrastructure within two zones in the County (in the North and in the South) scored highest. The infrastructures included within the preferred option were up to three small scale Energy from Waste (EfW) facilities, eight windrow composting and a further five In-Vessel Composting (IVC) plants, seven landfills for final disposal and up to five Material Recycling Facilities (MRFs), seven transfer stations and thirteen Household Waste Recycling Centres (HWRCs).

The recommendations on implementing the preferred option strongly emphasised the need for all the districts and the County to increase recycling and composting rates using kerbside collection, bring banks and HWRCs. The strategy also emphasised the time requirements for

delivery of the consultation, planning and commissioning stages for a thermal treatment solution.

Draft Addendum Strategy Report 2005

A subsequent draft addendum report was produced in 2005. The review process identified new technologies and incorporated more current data including waste arisings and composition. The addendum provided an update to the following:

- The statistical data the strategy was based on;
- Legislative context, with the main impact being the increased biodegradable content of municipal solid waste from 60% to 68%;and an
- Update on new technologies and impact on the preferred option. Mechanical Biological Treatment (MBT) was the main new technology considered. MBT is a residual waste treatment option, but the output still needs to be disposed of either through thermal treatment or landfill.

The addendum indicated that the preferred option identified in the 2002 strategy was still valid, but could also be delivered with a variety of residual waste treatment technologies (e.g. Anaerobic Digestion (AD), MBT and EfW). The preferred option did therefore still include a combination of higher recycling and composting, with EfW to achieve the diversion of biodegradable waste from landfill targets as set by Defra.

This addendum document has always remained as a draft addendum.

Joint Municipal Waste Strategy, Draft Core Discussion Document March 2007

Following the successful award of a Defra Local Authority Support Unit (LASU) grant, the Lincolnshire Waste Partnership funded an exercise to update and restructure the waste strategy documents, incorporating the renewed aims and objectives of the Lincolnshire Waste Partnership, whilst retaining the thrust and direction of the original strategy. A draft core discussion document was produced in line with new Government Guidance on Municipal Waste Management Strategies produced by Defra in July 2005. This discussion document concluded that a complete refresh of the strategy (including baseline and options appraisal modelling) was required concurrently with a Strategic Environmental Assessment (SEA).

It was clear that the Lincolnshire Waste Partnership needed to take action to implement the existing waste strategy if they were to meet recycling targets, avoid the impacts of rising landfill tax and the significant fines from continuing to landfill their waste. Therefore, whilst the district authorities commenced with the implementation of higher performing collection schemes, the County Council began the process of developing a business case to identify the preferred approach to delivering the required residual waste treatment.

Outline Business Case for residual waste treatment facility

In the summer of 2006 independent advisors were commissioned by Lincolnshire County Council to develop an Outline Business Case (OBC) to support the procurement of residual waste treatment facilities. The OBC will assess the available technical, financial and procurement options in order to develop an acceptable solution to divert residual waste from landfill and thus enable the county to meet its landfill allowance targets (LATS) by 2020 and avoid substantial fines. The OBC cannot be finalised until the current consultation process is complete.

1.2 Where are we now?

Whilst the Lincolnshire County Council procurement project progresses, the Partnership is in the process of developing a new JMWMS to comply with the revised government guidance on waste strategies and the SEA Directive.

The new JMWMS will determine the direction that the Partnership will take for dealing with its municipal waste and how it will meet the revised recycling/composting target of 55% by 2015 and the regional and national targets as set in the regional waste strategy[2] and the new Waste Strategy for England 2007[3].

The Strategy details the challenges facing the Partnership, which primarily includes the diversion of waste away from landfill in order to meet statutory targets, and thereby to avoid significant financial penalties under the Landfill Allowance Trading Scheme (LATS). Consequently, the Partnership needs to develop a long-term solution to manage its waste streams: one in which waste is viewed as a resource and managed in a more sustainable manner. The challenges that need to be addressed by the strategy are:

- To increase recycling and composting
- To reduce the amount of biodegradable waste going to landfill
- To reduce the amount of residual waste requiring final disposal
- To minimise the amount of waste arising in the county
- To address the rising cost of waste management

The Partnership has developed a vision of what the new Strategy should aim to achieve. This vision is summarised in the following 10 key objectives:

Objective 1. To prevent the growth in municipal waste by promoting waste reduction and reuse initiatives to ensure no more than 225kg of residual household waste per person is produced by 2020.

Objective 2. To promote waste awareness through co-ordinated public education and awareness campaigns, and effective community engagement.

Objective 3. Across Lincolnshire to achieve 55% recycling and composting by 2015.

Objective 4. Across Lincolnshire to achieve a uniform dry recyclables waste stream by 2013.

Objective 5. To progressively increase the recovery and diversion of biodegradable waste from landfill to meet and exceed the Landfill Directive diversion targets.

Objective 6. To ensure that residual waste treatment supports energy recovery and other practices higher up the waste hierarchy.

Objective 7. To deliver best value for money waste management services addressed on a countywide basis.

Objective 8. To engage with local businesses to encourage the reduction and recycling of commercial waste.

Objective 9. To actively engage, lobby and work with local, national, governmental and other organisations on sustainable waste management issues.

Objective 10. As Local Authorities, to set an example by preventing, reusing, recycling and composting our own waste and using our buying power to positively encourage sustainable resource use.

2 East Midlands Regional Waste Strategy, January 2006

3 Waste Strategy for England 2007, Defra

The Partnership recognises that delivering these objectives will require the implementation of specific activities, which are summarised below:

- Increase awareness amongst residents, local communities, and businesses about managing the waste they produce, and involving them in the planning and delivery of waste management services.
- Recycling and composting as much as practicable and working towards greater commonality of services to improve waste management services.
- Plan for and provide a new residual waste treatment facility to divert waste from landfill.

1.3 Strategic environmental assessment – an overview

The Environmental Assessment of Plans and Programmes Regulations 2004 introduced a requirement for a Strategic Environmental Assessment (SEA) to be produced for a number of statutory documents including Municipal Waste Management Strategies. As the Partnership is revising its Waste Strategy, there is a statutory requirement to undertake an SEA on this document.

In order to be most effective, the Office of the Deputy Prime Minister[4] recommends that the SEA process, including the preparation of the Environmental Report, should be conducted at the same time as the waste strategy is prepared. The Partnership believes that revising its waste strategy in parallel with the preparation of the SEA will provide significant benefits, as implementation of the strategy, through long-term procurement of waste management infrastructure, would then be supported by the SEA.

AEA Energy & Environment has been commissioned by Lincolnshire County Council to undertake the SEA and help revise its waste strategy.

In the first stage of the SEA process a Scoping Report[5] was produced. The Scoping Report:

- Described the SEA procedure;
- Considered the impact of other relevant strategies, plans and programmes;
- Provided background information;
- Consulted statutory and key local/regional consultees;
- Outlined the criteria that will be used for conducting the SEA assessment; and
- Outlined the waste management scenarios considered for assessment.

The draft Environmental Report represents the second stage of the SEA process. The purpose of the Environmental Report is:

- To summarise the baseline information;
- To describe the assessment methodology and the key assumptions made;
- To model a range of different waste management scenarios;
- To evaluate the relative impacts of each waste management scenario for each of the 28 criteria which were identified for conducting the assessment;
- To assess the significance and sensitivity of any of these effects; and
- To assess the internal compatibility of the SEA objectives.

4 A Practical Guide to the Strategic Environmental Directive, ODPM 2005

5 Strategic Environmental Assessment of LWP's Waste Strategy – Scoping Report. Report by AEA to Lincolnshire County Council, November 2007

The Environmental Report also identifies data gaps and limitations, and discusses how professional judgement was used to assess the risk of any inadequacies.

The third stage of the SEA process involves:

- A 3-month public consultation exercise on the draft Environmental Report to seek the public's views on services, waste treatment technologies, and the weighting of the criteria categories;
- The assigning of weightings to each of the assessment criteria categories, and
- Finalising the Environmental Report.

The outcomes from the consultation exercises, including the final weighting of the criteria, have now been incorporated into the final technical evaluation and presented in this final version of the environmental report.

2 Baseline information

This section presents background information that needs to be considered in assessing the Partnership's Waste Strategy. The key sustainability issues for the Partnership were identified in the Scoping Report that enabled the criteria and targets for assessing the Waste Strategy to be developed.

Within the East Midlands Region, Lincolnshire is the largest County covering 592,075 hectares, and the fourth largest in England covering 5% of England. Lincolnshire was one of the fastest growing populations in England between 1991 and 2001 at 10% compared to 3% nationwide. Since 2001 and up to 2005, Lincolnshire's population grew by a further 5%, with wide changes between the districts. North Kesteven grew by a further 8.2% compared to 2.9% in South Kesteven, and in general the rural areas are growing faster than Lincoln City. Looking at the population, Lincolnshire has an ageing population with more than 19% of its population being over 65 years of age, with the highest proportion residing in East Lindsey at 23%.

Lincolnshire was home to 678,700 people in 2005[6], living predominantly in rural areas (70%). The average household is made up of 2.26 persons compared to 2.36 for England as a whole.

2.1 Waste management

This section summarises the information on current municipal waste arisings, waste composition, recycling and disposal of waste. Further details can be found in the Scoping Report.

Within Lincolnshire, it is the district councils (WCAs) that have the responsibility to collect the waste, and the County Council (WDA) that has the responsibility to dispose of it. This results in a variety of different collection services and service providers (either in-house or contractor). In addition, the County Council operates 12 HWRCs across the county to enable residents to recycle, compost and dispose of waste materials.

2.1.1 Waste arisings

The total amount of municipal waste arising in 2006/07 in Lincolnshire amounted to 365,537 tonnes, of which 349,663 tonnes was household waste. Table 2.1 below shows the breakdown of the household waste arising.

Table 2.1: Breakdown of household waste tonnage data (2006/07)

Waste stream	Tonnage
Recycled	79,970
Composted	62,608
Landfilled	207,085
Total	**349,663**

[6] The Changing Demographics of Lincolnshire - An update on population trends in the county, November 2006. http://www.research-lincs.org.uk/

2.1.2 Waste composition

It is important to understand the composition of the waste collected from within the county, as it will determine the available proportions of materials that can be extracted and recovered from the waste. It is also key to assessing the types of facilities required and collection systems needed to extract each component of the waste. In LincoInshire, Lincoln City (2000), East Lindsey (2004) and South Kesteven (2004) have conducted research into the composition of mixed residual waste collected from householders. Lincoln City's research was conducted in October 2000, sampling nearly 25,000 tonnes and analysing it for composition.

Table 2.2 presents a comparison of the outcomes of the waste composition studies completed, however this should be used carefully as each study used a different methodology.

Table 2.2. Waste composition comparison

	East Lindsey (2004)	Lincoln City (2000)	South Kesteven (2004)
Category	**% of the total weight**	**% of the total weight**	**% of the total weight**
Recyclable paper	26.7%	12.7%	13.8%
Recyclable card	4.9%	5.4%	
Non-recyclable paper/card	3.1%	1.2%	4.2%
Garden waste	2.6%	5.4%	45.5%
Kitchen waste	26%	31.5%	
Animal waste	1.9%	5.2%	0.0%
Plastic film	5.6%	6.0%	6.8%
Dense plastic	5.1%	6.4%	5.4%
Textiles	1.3%	3.0%	3.0%
Miscellaneous combustible	1.6%	7.3%	7.4%
Miscellaneous non-combustible	4.0%	0.1%	2.9%
Glass	7.0%	7.7%	5.7%
Non-recyclable glass	0.5%	0.9%	
Ferrous metals	2.3%	3.5%	2.7%
Non-ferrous metals	0.8%	0.9%	0.7%
Other metals	0.3%	0.4%	0.0%
Fines	1.9%	0.5%	0.9%
Wood	1.5%	0.5%	0.0%
WEEE	0.6%	0.7%	0.9%
Hazardous	0.6%	0.2%	0.0%
Clinical	0.2%	0.1%	0.0%
Other		0.5%	
Total	**100%**	**100%**	**100%**

2.1.3 Current recycling and composting

The Partnership brings together seven waste collection authorities that have responsibility for collecting waste arising from household and commercial premises. Table 2.3 presents the different schemes that are currently running in each district for household waste. Out of the seven districts, five have moved to alternate weekly collection for residual waste and recycling. Two districts (Boston and South Holland) are not currently operating a green waste kerbside collection. Boston trialled a Saturday green waste collection in Autumn 2007 and is planning to run the collection again next year.

As shown in Table 2.3 there are some differences between the green waste collection schemes operated by the districts. Of the five districts running such a scheme, two offer it on an opt-in basis (South Kesteven and West Lindsey).

Table 2.3: Current waste management services

Local Authority	Residual Waste	Dry Recyclables	Green Waste
Boston	Alternate weekly collection majority in 240 litre bins	Alternate weekly in 240 litre bins Mixed paper, card, plastic bottles, tins and cans	Not currently collected
East Lindsey	Alternate weekly collection majority in 180 litre bins	Alternate weekly in 240 litre bins Mixed paper, card, plastic bottles, tins and cans	Alternate weekly in 240 litre bin
City of Lincoln	Alternate weekly collection in 240 litre bins or weekly collection in 140 litre bins (inner city areas)	Alternate weekly in 240 or 140 litre bins Mixed paper, card, plastic bottles, tins and cans	Alternate weekly in 240 litre wheeled bin
North Kesteven	Alternate weekly collection majority in 240 litre bins	Alternate weekly in 240 litre bins Mixed paper, card, plastic bottles, glass containers, textiles, tins and cans	Alternate weekly in 240 litre bin
South Holland	Weekly black sack collection	Weekly sack collection Mixed paper, card, plastic bottles, plastic film, textiles, tins, cans and glass	Not currently collected
South Kesteven	Alternate weekly collection majority in 240 litre bins	Alternate weekly in 240 litre bins Mixed paper, card, plastic bottles, textiles, tins, cans and glass	Opt in system with a bin charge. Alternate weekly 240 litre bins
West Lindsey	Weekly collection majority in 180 litre bins	Alternate weekly in 240 litre bins Plastic bottles, glass, card, tins and cans Separate paper collection.	Opt in system with a bin charge. Alternate weekly 240 litre bin

Looking at the materials collected through the kerbside schemes, all seven districts collect paper, card, plastics and cans. North Kesteven, South Kesteven, West Lindsey and South Holland also collect glass, and Lincoln City and East Lindsey are looking to include this in their mix. Table 2.4 summarises the materials collected by each district.

Table 2.4. Materials recycled in each partnering authority

	Dry recyclables collected at the kerbside					
Local Authority	Paper	Card	Glass	Plastic	Metal	Textiles
Boston	✓	✓		✓	✓	
East Lindsey	✓	✓		✓	✓	
Lincoln City	✓	✓		✓	✓	
North Kesteven	✓	✓	✓	✓	✓	✓
South Holland	✓	✓	✓	✓	✓	✓
South Kesteven	✓	✓	✓	✓	✓	✓
West Lindsey	✓	✓	✓	✓	✓	

Since 2002, when the original municipal waste management strategy was produced, recycling and composting performance has changed significantly, primarily through the expansion and introduction of new collection services (such as kerbside collection of dry recyclables and garden waste) and the improvement of recycling rates at household waste recycling centres.

Table 2.5 below provides details of the household waste recycling rates achieved between 2001 and 2007 for each district and for the County overall. As it can be seen in Table 2.5 there is wide variation between the recycling rates achieved across the seven authorities. However, overall Lincolnshire County achieved a 40% recycling rate in 2006/7.

Table 2.5: Municipal recycling and composting rates between 2001 and 2007

	2001	2002	2003	2004	2005	2006	2007
Boston	7%	7%	7%	20%	28%	22%	26%
East Lindsey	8%	7%	9%	17%	20%	21%	36%
Lincoln	10%	10%	11%	16%	24%	29%	36%
North Kesteven	5%	5%	16%	10%	39%	49%	56%
South Holland	9%	9%	15%	15%	16%	21%	23%
South Kesteven	7%	7%	7%	14%	15%	26%	30%
West Lindsey	7%	7%	9%	15%	24%	32%	33%
Lincolnshire	**8%**	**7%**	**10%**	**20%**	**27%**	**33%**	**40%**

Figure 2-1 below, presents a breakdown of how waste was managed in each authority during 2006/7. The main variation is the amount of waste collected for composting. The information for Lincolnshire County relates to the amount of waste delivered to the 12 Household Waste Recycling Centres (HWRC) operated by the County Council.

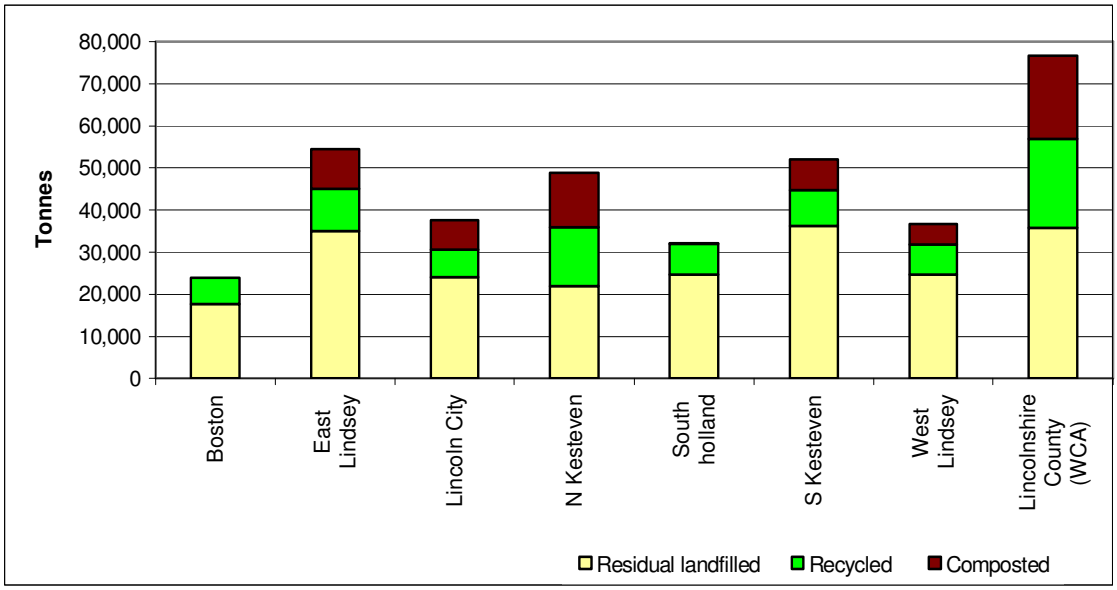


Figure 2-1: Waste management in each authority

2.1.4 Existing contracts

This section briefly presents the current contracts in place to manage waste across the Partnership.

Composting:

Five of the districts currently offer a green waste kerbside collection. In addition, Lincolnshire County Council provides 12 Household Waste Recycling Centres (HWRC) across the County to enable residents to recycle, compost and dispose of waste materials. The County operates 12 composting facility contracts and composted 61,982 tonnes of municipal green waste in 2006/7.

Residual waste

Residual waste treatment facilities in the County are limited to landfill. Lincolnshire County Council disposed of 224,555 tonnes of municipal waste to landfill in 2006/07.

Dry recycling

Five of the Waste Collection Authorities have contractual arrangements with differing private sector operators to process their dry recyclables. There are currently 5 MRFs used to process recyclable materials, two of which are located out of the county. In addition to these facilities, the County Council has let a contract to construct and operate a centralised MRF that will be available for the waste collection authorities to use in the near future (estimated date 2009). Between them, the waste collection authorities also have 197 bring sites enabling the public to recycle cans, paper, glass, textiles and books. Each district is responsible for waste collection arrangements and these are presented in Table 2-6 and Table 2-7.

Table 2.6 Current dry recycling contracts

	Current Material Description	Current Destination
East Lindsey	Mixed paper, card, plastic bottles, tins and cans collected fortnightly in wheeled bins	Greenstar Ltd, Addlethorpe, Skegness (County contract)
West Lindsey	Card, plastic bottles, glass containers, tins and cans collected fortnightly in wheeled bins Separate paper collection	Fox (Owmby) Ltd, Caenby Corner (District contract)
City of Lincoln	Mixed paper, card, plastic bottles, tins and cans collected fortnightly in wheeled bins	HW Martin Ltd (Handler) transporting to Grosvenor Ltd, Peterborough MRF, Peterborough or Transcycle Ltd, Derby (County contract)
North Kesteven	Mixed paper, card, plastic bottles, plastic containers, glass containers, textiles, coat hangers, tins and cans collected fortnightly in wheeled bins	Mid UK Recycling Ltd, Caythorpe (District contract)
South Kesteven	Mixed paper, card, plastic bottles, plastic containers, glass containers, textiles, tins and cans collected fortnightly in wheeled bins	Mid UK Recycling Ltd, Caythorpe (District contract)
Boston	Mixed paper, card, plastic bottles, tins and cans collected fortnightly in wheeled bins	HW Martin Ltd (Handler) transporting to Grosvenor Ltd, Peterborough MRF, Peterborough or Transcycle Ltd, Derby, (District contract)
South Holland	Mixed paper, card, plastic bottles, plastic containers, plastic film, textiles, coat hangers, glass, tins and cans collected weekly in boxes	Mid UK Recycling Ltd, Caythorpe (District contract)

Table 2.7 Current collection contract arrangements

Boston	In house collection
East Lindsey	In house collection
Lincoln	New contract with Cory Environmental in 2006
North Kesteven	In house collection
South Holland	In house collection
South Kesteven	In house collection
West Lindsey	In house collection

2.1.5 Cost

The costs of waste management in 2006/07 outlined in Table 2.8 and Table 2.9 are the costs reported by the individual authorities to Defra through Waste Data Flow. There are some noticeable variations between the districts: Boston has the lowest cost per household at £33.54, compared with £64.28 for East Lindsey.

Table 2.8 Cost of waste collection for 2006/07

Collection of household waste	Number of HH	Overall cost for collection	£/ HH
Boston[7]	27,130	£905,580	**33.54**
East Lindsey	63,423	£3,769,367	**64.28**
Lincoln	40,836	£2,103,621	**52.63**
North Kesteven	45,187	£2,211,074	**49.73**
South Holland	36,867	£1,808,976	**44.39**
South Kesteven	56,651	£2,646,292	**48.65**
West Lindsey	38,837	£2,273,242	**59.98**

Table 2.9 Provisional cost of waste disposal 2006/07

Final Disposal of household waste *(including landfill tax)*	Overall amount landfilled	Overall cost of disposal	£/ tonne
Lincolnshire County	365,537	£17,270,000	**£47.25**

[7] Data provided directly by Boston Borough Council

2.2 Growth rate

Two growth rates need to be carefully considered for modelling purposes, the growth in the number of households over time, and the growth of waste arisings. These two rates will impact on the overall amount of waste arising across the Partnership in the future.

2.2.1 Population and households

The overall population for Lincolnshire County was 678,700, living in 304,223 households in 2006 with an average density of 1.05 person per hectare. The population density varies greatly between the districts from 0.69 in West Lindsey to 23.98 in Lincoln City. Lincolnshire's population has increased considerably between 1991 and 2001 as can be seen in Table 2.10.

Table 2.10: Population changes between 1991 and 2001

	Population 1991	Population 2001	% Change
Boston	53,300	55,750	+ 5%
East Lindsey	117,700	130,447	+ 11%
Lincoln	84,000	85,595	+ 2%
North Kesteven	80,000	94,024	+ 18%
South Holland	67,500	76,533	+ 13%
South Kesteven	109,500	124,792	+ 14%
West Lindsey	76,500	79,515	+ 4%
Lincolnshire County	588,600	646,645	+ 10%

Population and household growth for the next 20 years need to be taken into consideration when developing the waste management scenarios to be modelled. Table 2.11 presents the growth in the number of households forecasted for the county based on the additional planned housing units in the East Midlands Regional Housing Strategy[8]. The waste strategy will need to consider the impact of additional population growth in specific areas of the county nominated as growth points (Grantham and Lincoln), and areas that are more affected than others by immigration and seasonal migration mainly linked to casual farming work and tourism.

[8] East Midlands Regional Plan –Housing Policy Justification Paper: http://www.emra.gov.uk/files/file1054.pdf

Table 2.11. Household growth for the County

	Number of HH	HH growth (%)
2006	304,223	
2007	308,173	1.29%
2008	312,123	1.28%
2009	316,073	1.27%
2010	320,023	1.25%
2011	323,973	1.23%
2012	327,923	1.22%
2013	331,873	1.20%
2014	335,823	1.19%
2015	339,773	1.18%
2016	343,723	1.16%
2017	347,673	1.15%
2018	351,623	1.14%
2019	355,573	1.12%
2020	359,523	1.11%

2.2.2 Overall waste growth

The overall growth in waste arisings is affected by a number of factors. These vary depending on the type of waste and can include:

- GDP growth;
- Disposable income;
- Business development;
- Population increase and/or changes in population demographics;
- Changes in housing stock levels;
- Environmental legislation (e.g. Packaging and Packaging Waste Directive);
- Fiscal measures (e.g. Landfill Tax, Aggregates Levy, LATS); and
- Waste generation per household.

Consequently, unless waste minimisation activities reduce waste arisings per household at a faster rate than the growth in the number of households, overall waste arisings will continue to increase.

The total amount of municipal waste generated in Lincolnshire has increased over the last decade although the average growth rate has reduced from 6% between 1996-2001 to less than 2% between 2000 and 2007. Table 2.12 below provides a summary of waste growth trend from 2000 to 2007.

Table 2.12: Municipal Waste growth trends in LincoInshire between 2000 and 2007

	Tonnage of MSW	% Change
2000/01	322,715	
2001/02	333,927	3.47
2002/03	339,724	1.74
2003/04	340,800	0.32
2004/05	362,662	6.41
2005/06	359,990	-0.74
2006/07	365,536	1.54
Average Rate of Change		**2.12%**

The growth rate has fluctuated considerably, with an overall reduction in municipal waste generation between 2005 and 2006. In order to make future waste growth projections, the current strategy assumes that the waste growth rate between 2000 and 2026 continues at less than 2% using a medium growth scenario. When these trends are applied municipal waste generation is assumed to reach in excess of 420,000 tonnes by 2015. Table 2.13 presents the overall waste growth taking into consideration the growth in the number of households and waste growth per household.

Table 2.13 Projected waste growth rate for LincoInshire

	Number of households	Number of households growth (%)	Waste growth rate per HH (%)	Overall waste growth rate (%)
2006	304,223			0.7%
2007	308,173	1.30%	0.40%	1.7%
2008	312,123	1.28%	0.42%	1.7%
2009	316,073	1.27%	0.43%	1.7%
2010	320,023	1.25%	0.45%	1.7%
2011	323,973	1.23%	0.47%	1.7%
2012	327,923	1.22%	0.48%	1.7%
2013	331,873	1.20%	0.50%	1.7%
2014	335,823	1.19%	0.51%	1.7%
2015	339,773	1.18%	0.52%	1.7%
2016	343,723	1.16%	0.54%	1.7%
2017	347,673	1.15%	0.55%	1.7%
2018	351,623	1.14%	0.56%	1.7%
2019	355,573	1.12%	0.58%	1.7%
2020	363,473	1.10%	0.60%	1.7%

2.3 Development of scenarios

Any future waste management system needs to integrate all the different tiers of the waste hierarchy. However, it should be noted that there is no definitive list of 'technology mixes' available to deliver an integrated solution for managing waste, although there are a large number of possible combinations. However, detailed modelling places limitations on the ultimate number of combinations that can be tested. As a result, it is important that the range and combinations of technologies tested are on the one hand sufficiently representative of the possible scenarios, but also include consideration of the main issues and factors specific to the Partnership (e.g. projected changes in the number of households and future waste arisings).

General issues to be considered when assessing the future waste management options for the Partnership are outlined below, and are intentionally ordered to reflect each level of the Waste Hierarchy (Figure 2-2).

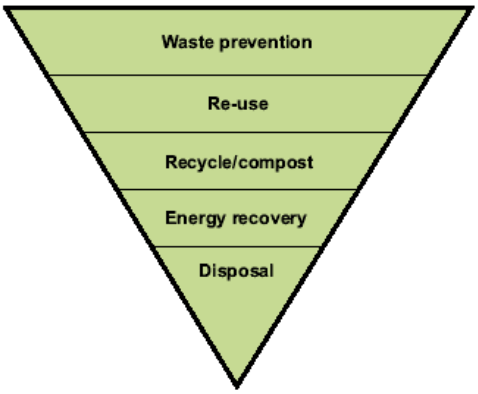


Figure 2-2: The Waste Hierarchy

These issues indicate a range of factors to be tested within the modelled scenarios. Each modelled scenario will include the following:

- Waste growth rate/ waste minimisation/ re-use
- Recycling performance, dry recycling and composting
- Appropriate residual waste treatment to meet the LATS targets

Within all the scenarios to be modelled, the recycling rate has been kept the same, i.e. to achieve a 55% recycling in 2015 across the Partnership.

The treatment of kerbside collected organic waste willl be assessed, evaluating the current technology used across the Partnership, which is windrow composting. In-Vessel Composting (IVC) could be an alternative technology, but is a more expensive technology, and so is best used when kitchen waste is co-collected with garden waste. The Partnership commitment is currently to maximise the diversion of garden waste using the current schemes. However, the Partnership will review the feasibility of kitchen waste recycling in the medium and longer term. The impact of a system that would include kitchen waste collection has been modelled on one of the best performing scenarios and can be found in section 7.5.

The main variable in the scenarios is the technology considered for the treatment of the residual waste stream in order to reduce its biodegradability content, as this will be required for the Partnership to meet its future LATS requirements.

The Partnership has identified a number of residual treatment technologies that need to be tested through the SEA assessment:

1. Landfill
2. Mechanical Biological Treatment (MBT) with aerobic stabilisation
3. Mechanical Biological Treatment with Refuse Derived Fuel (RDF) used on site in an Energy from Waste (EfW) plant
4. Mechanical Biological Treatment with Refuse Derived Fuel to a 3rd party
5. Mechanical Biological Treatment with anaerobic digestion and aerobic stabilisation
6. Mechanical Biological Treatment with anaerobic digestion and aerobic stabilisation, and Refuse Derived Fuel used on site in an EfW
7. Energy from Waste
8. Energy from Waste with Combined Heat and Power (CHP) generation
9. Advanced Thermal Treatment (ATT) – Gasification

Table 2.14 presents the scenarios modelled for the SEA. It should be noted that the Partnership has already secured a site to build a new waste treatment facility. This means that the scenarios will only consider a centralised treatment facility for the county rather a number of facilities across the County as no other sites have been secured for that purpose.

Table 2.14: Scenarios modelled in the SEA

	Overall waste Growth	Source segregated waste		Mixed Waste				
		Recycling*	Kerbside garden waste	Residual treatment	Treatment organic residuals	Use of compost	Fuel production & treatment	Landfill
1	1.7%	55% 2015	Windrow	Landfill	None	N/A	None	All waste to landfill
2	1.7%	55% 2015	Windrow	MBT	Aerobic	Stabilised output to landfill	None	Remaining waste
3	1.7%	55% 2015	Windrow	MBT	None	Stabilised output to landfill	RDF on site	Remaining waste
4	1.7%	55% 2015	Windrow	MBT	None	Stabilised output to landfill	RDF/SRF to 3rd party	Remaining waste
5	1.7%	55% 2015	Windrow	MBT	AD + Aerobic	Stabilised output to landfill	Biogas	Remaining waste
6	1.7%	55% 2015	Windrow	MBT	AD + Aerobic	Stabilised output to landfill	RDF on site and biogas	Remaining waste
7	1.7%	55% 2015	Windrow	EfW + electricity	None	N/A	N/A	Remaining waste + ash
8	1.7%	55% 2015	Windrow	EfW + CHP	None	N/A	N/A	Remaining waste + ash
9	1.7%	55% 2015	Windrow	Gasification	None	N/A	N/A	Remaining waste

Sensitivity analysis will consider the following:

- Different waste/population growth. What impact does that have?
- Failure to secure markets for RDF material to third parties.
- Impact of varying LATS values. How may the total cost of waste management change?
- Impact of current landfill contract
- Impact of introducing a kitchen waste collection

2.4 Assessment criteria

A list of criteria to be assessed within the SEA was proposed and consulted on during the scoping study consultation. The criteria can be grouped into five main categories:

- Environmental factors
- Economic factors
- Social factors
- Deliverability of waste management option
- Waste hierarchy and policy

Table 2.15 presents the assessment criteria grouped into 14 categories with the proposed weightings (please note that the categories are not in any order of priority). The 28 individual assessment criteria are provided in

Table 2.16 (environmental criteria) and Table 2.17 (other criteria).

The Partnership proposed a weighting for each of the criteria which were consulted on at the scoping stage, and again during the public consultation by a number of stakeholders. The agreed weightings after the public consultation have been used for the assessment. Table 2.15 presented the initially proposed weighting and the final agreed weightings.

Table 2.15: Criteria for assessment in 14 categories

	Criteria	Proposed weightings (%)	Agreed weightings after consultation (%)
1	Minimise **nuisance** from noise, odour, dust, litter and vermin generation	7.4%	**7.80%**
2	Minimise **local transport movements**	5.5%	**7.82%**
3	Minimise **local health** impact from waste treatment technologies	9.2%	**6.81%**
4	Minimise impact to **soil and water and air quality**	9.2%	**5.36%**
5	Help tackle **climate change** by minimising greenhouse gas emissions	9.2%	**9.77%**
6	Minimise **visual** impact	3.2%	**2.81%**
7	Maximise **resource efficiency** (land, water and other resources)	5.5%	**4.57%**
8	Minimise **costs** of waste management	7.4%	**8.61%**
9	Maximise **economic and social benefits**	6.4%	**6.33%**
10	Minimise **risks** through ensuring **maturity and flexibility of technology**	8.3%	**5.63%**
11	Maximise **public acceptability** and likelihood of obtaining planning permission	7.4%	**6.83%**
12	Ease of **public participation** and **health and safety implications**	4.6%	**5.23%**
13	Meet targets for reduction, recycling/composting and recovery	7.4%	**10.74%**
14	Meet government **targets set for diverting biodegradable waste** from landfill	9.2%	**11.70%**
	TOTAL	100%	**100.00%**

Table 2.16: Assessment of environmental criteria (unranked)

Factor		Final criteria/ objective	Measurement	Criteria
Environmental factors	Population & human health	To minimise noise level	Comparative data and/ or professional judgement *	1
		To assess extent of odour problems	Comparative data and/ or professional judgement *	
		To assess extent of dust problems	Comparative data and/ or professional judgement *	
		To assess extent of litter and vermin generation	Comparative data and/ or professional judgement *	
		To minimise local transport impacts	Total distance waste is transported per year	2
		Proximity principle and ability to close the loop locally.	Total distance waste is transported per year	
		To minimise the health impact locally from waste treatment technologies.	Human toxicity index (WRATE)	3
	Water, soil and air quality	To minimise adverse affect on water quality	Level of eutrophication (WRATE)	4
		To minimise the amount of hazardous waste landfilled	Amount of hazardous waste landfilled	
		To minimise air quality impact from waste treatment and transport emissions	Impact on local air quality (SO_2 eq.) through WRATE	
	Climate change	To reduce greenhouse gas emissions	Emission of greenhouse gases including waste treatment and transport (WRATE)	5
			Amount of energy produced through waste treatment (net of energy consumption)	
	Landscape & townscape	To minimise the visual and landscape impact	Comparative data and/ or professional judgement *	6
	Resource depletion	To ensure the prudent use of land	Total of average land take (hectares)	7
		To ensure the prudent use of water (e.g. consider potential re-circulation of water)	Total of water for treatment (m3)	
		To increase resource efficiency	Abiotic resource depletion (WRATE)	

* Comparing impact from different treatment technologies and capacities.

There are other criteria that would need to be assessed as part of a SEA for a planning document; these include impact on historic heritage, wildlife, and areas with increased flood risk. However, they were not assessed in this SEA, as the Waste Strategy is not required to identify specific locations for any new waste treatment facilities.

Table 2.17: Assessment of other criteria (unranked)

Factor	Final criteria/ objective	Measurement	Criteria
Economic factors	To minimise cost of waste management	Total cost of waste collection, waste treatment & disposal (incl. revenue from energy & products, excl income/penalties from LATS (£ over 25 years)	8
	Economic benefits generated considering new businesses and regeneration of the community.	Number of jobs generated through waste management	9
		Partnership arrangements with community recycling, community enterprises and charities and Level of new business start-ups net of closures	
Social factors	Opportunities for public involvement and education	Number of households included on collection of residual waste and measurement of effort going into promotion of recycling	
Deliverability of waste management options	To assess maturity of technology, i.e. how secure is it in future, how effective is it and what is the risk of technology failure?	Professional judgement *	10
	To assess the flexibility of the waste management system to changes in future policy, waste arisings etc.	Professional judgement *	
	To assess public acceptance and the likelihood of achieving of planning permission	Professional judgement *	11
	To assess public involvement required to achieve targets and will it be sustainable in the long-term	Participation rate required and how effective the recycling schemes have to operate to achieve recycling target. Access to recycling facilities - Number of households receiving collection for dry recyclables and organic waste	12
Waste policy	Level of waste minimisation and re-use achieved	Total waste arisings	13
	Level of recycling and composting achieved	Percentage of materials recycled and composted	
	Level of waste recovery achieved	Percentage of materials recovered	
	Level of biodegradable waste diversion from landfill achieved	Percentage of biodegradable material diverted from landfill	14

**Comparing impact from different treatment technologies and capacities.*

3 Modelling of scenarios

The evaluation of each scenario has to consider each of the 28 assessment criteria listed in

Table 2.16 and Table 2.17. AEA's in-house modelling tool (WasteFlow model) was used to assess the criteria on recycling, recovery, landfill diversion, and costs. The data and the results from WasteFlow modelling are discussed in this section. The Environment Agency's WRATE[9] software was used to assess the criteria on emissions, climate change, human health, and resource use. Other criteria (such as odour emissions) were assessed using professional judgement, as no suitable modelling tools are available.

AEA's Wasteflow model was used to:

- Model future waste arisings considering the Partnership's waste minimisation initiatives and number of households growth;
- Assess performance against recycling/composting, recovery and landfill diversion targets; and
- Calculate costs of future waste management including collection services, waste treatment and disposal.

The SEA was undertaken for a specific financial year in the long-term (2015/16). However, the performance against cost for all scenarios covers the period from 2010 to 2040, based on a typical 25 year lifetime for a treatment plant processing the Partnership's residual municipal waste stream. It should be noted that the SEA was undertaken for the Partnership overall rather than the individual districts.

3.1 Modelling of recycling and recovery

3.1.1 Source separation schemes

A household waste recycling and composting target of 55%, across the Partnership in 2015 has been determined during the public consultation and in discussion with the Partnership. The strategy objective is to achieve 55% recycling through kerbside collection of dry recyclable materials, kerbside collection of green waste, bring sites, HWRCs and potential kerbside collection of kitchen waste. Through the modelling of the scenarios, targets of 32% recycling and 23% composting countywide have been set to deliver the overall 55% recycling targets, and calculate the amount of residual waste to be treated.

A number of the collection services have recently been improved across the Partnership (with five districts running alternate weekly refuse collection), and achieving the collection rates for both dry recyclables and green waste to reach the 55% countywide recycling target should be possible with the current services in place.

To help achieve these diversion rates, the Partnership is committed to implementing an intensive and long-term education and awareness campaign. The campaign will also focus on waste minimisation and re-use, and increasing recycling performance at the HWRCs.

[9] WRATE: Waste and Resource Assessment Tool for the Environment software which replaced WISARD software in 2007

3.1.2 Specification of residual waste treatment facilities

The Environmental Agency's WRATE software (which is based on data from existing plants) was used to model:

- Mechanical Biological Treatment,
- Mechanical Biological Treatment and Anaerobic Digestion,
- Mechanical Biological Treatment and Refuse Derived Fuel
- Energy from Waste
- Advanced Thermal Technology (gasification)

Table 3.1 to Table 3.6 show the typical material and reject rates that can be expected and which have been assumed in the residual waste treatment facility modelling.

NOTE: Within the WRATE lifecycle tool, particular suppliers of waste technologies are required to be selected and consequently, the specific values stated above can vary between different suppliers. This is particularly the case for the MBT scenarios modelled.

Table 3.1: MBT-aerobic stabilisation (scenario2)

Product stream	Wt% of input feed material
Recycling (metals)	0.7
Residue to landfill	57.5
Compost stabilised to landfill	28.8
Process loss	13.0
Total	100.0

Table 3.2: MBT-RDF onsite or to 3rd party (scenario 3 and 4)

Product stream	Wt% of input feed material
Recycling (metals)	0.7
Residue to landfill	4.0
Compost stabilised to landfill	28.8
RDF onsite or to 3rd party	53.5
Process loss	13.0
Total	100.0

Table 3.3: MBT with anaerobic digestion (scenario 5)

Product stream	Wt% of input feed material
Recycling (metals)	5.0
Residue to landfill	10.0
Compost stabilised to landfill	40.8
RDF to landfill	12.5
Process loss	31.7
Total	100.0

Table 3.4: MBT with anaerobic digestion and RDF onsite (scenario 6)

Product stream	Wt% of input feed material
Recycling (e.g. metal, plastic, glass)	5.0
Residue to landfill	10.0
Compost stabilised to landfill	40.5
RDF onsite	12.5
Process loss	37.7
Total	100.0

Table 3.5: EfW incineration (scenario 7 without CHP and Scenario 8 with CHP)

Product stream	Wt% of input feed material
Metals recovered	3.0
Fly ash	3.0
Bottom ash recycled[10]	18.0
Bottom ash landfilled	6.0
Process loss	70.0
Total	**100.0**

Table 3.6: ATT- Gasification facility (scenario 9)

Product stream	Wt% of input feed material
Metals recycled	3.0
Fly ash	3.0
Bottom ash recycled[9]	18.0
Bottom ash landfilled	6.0
Process loss	70.0
Total	**100.0**

The assumed dates for starting operation of the waste management facilities in the assessed scenarios are:

- MRF - All scenarios - 2006/07
- Windrow (for green waste) – All scenarios – 2006/07
- Residual treatment facility (MBT, EfW & ATT) – Scenarios 2 to 9 – 2013/14 financial year

[10] Assumed that 75% of bottom ash is recycled as an aggregate substitute

3.1.3 Recycling, recovery and landfill diversion performance

The modelling was conducted applying the following assumptions:

- The reduced waste growth rates for municipal waste (shown in Section 2.2) are achieved;
- The recycling target (55%) set in the waste strategy for household waste is achieved
- The landfill diversion targets are met;
- The residual waste treatment facility accepts over 60% of the household residual waste, 30% of residual waste from HWRCs and all co-collected commercial residual waste;.
- The annual capacity for the residual waste treatment facility is set at a maximum of 150,000 tonnes, enough to meet and exceed landfill diversion targets, but not to treat all residual waste arisings; and.
- Current landfill contractual obligations are fulfilled.

Table 3.7 presents the recycling and recovery rates achieved for each scenario. The figures for recycling rates include metal recycled from the ATT and recyclables separated out from the MBT plants, which is why these scenarios achieve slightly higher recycling rates than the 55% set in the strategy. Metals from the EfW facility do not count towards recycling, only recovery. However, it should be noted that the Government is currently considering whether metals recovered at an EfW facility should be included in the calculation of the household waste recycling rate. It is also consulting on the inclusion of EfW bottom ash recycling and it may count towards recycling targets in future.

The stabilised output and reject product from the MBT facilities is sent to landfill and not counted as recycled or recovered. This is based on the uncertainty to secure adequate markets for the MBT output.

Table 3.7: Recycling, recovery and BMW diversion rates achieved by each scenario in 2015 (Wt %)

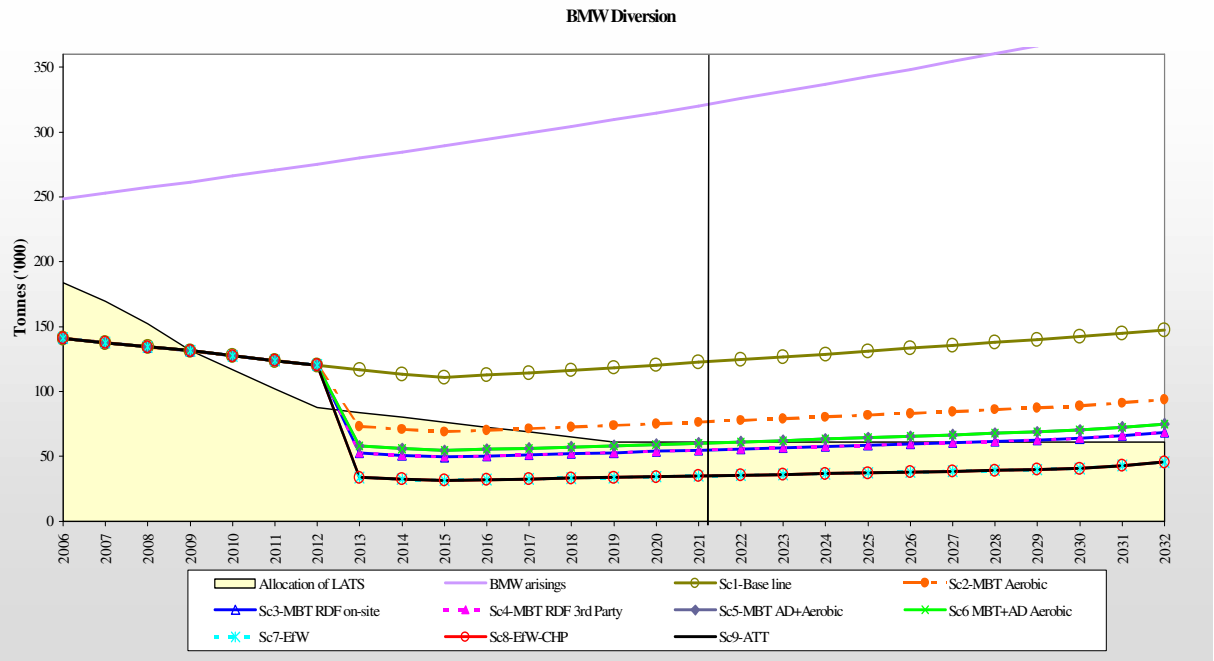
Scenario	Recycling and composting	Recovery (MSW)	BMW Diversion
Sc 1- Base Case Landfill only	55%	55%	62%
Sc 2- MBT-Aerobic	55%	59%	76%
Sc 3- MBT-RDF on site	55%	73%	83%
Sc 4- MBT-RDF to 3rd party	55%	73%	83%
Sc 5- MBT-AD + Aerobic	56%	65%	81%
Sc 6- MBT-AD + Aerobic with RDF onsite	56%	68%	81%
Sc 7 – EfW	55%	82%	89%
Sc 8 - EfW-CHP	55%	82%	89%
Sc 9- ATT Gasification	56%	82%	89%

Table 3.7 shows that:

- The MBT-AD + Aerobic scenario (5) and the MBT-AD + Aerobic and RDF on site scenario (6) achieve the highest household waste recycling rate. This is because of the additional materials (plastics and metals) that are extracted during the process compared to other scenarios.
- The ATT scenario (9) achieves slightly higher recycling than the EfW scenarios due to metal and glass being separated from the rest of the waste at the start of the process.
- The thermal treatment scenarios (scenarion 7, 8 and 9) achieve the highest MSW recovery rate.
- Some MBT processes achieve a lower waste recovery rate because of the amount of stabilised organic output and rejects from the MBT processes that is landfilled.
- All scenarios, except Base Case scenario (1), achieve high BMW diversion, with the thermal treatment achieving the highest.

Figure 3-1 shows the projected impact each scenario will have on the Partnership's ability to meet landfill diversion targets in the future.

Figure 3-1: Landfill diversion of biodegradable municipal waste



It shows that:

- Despite high recycling and composting rates, Lincolnshire will not meet any of its LATS targets post 2009/10 without further residual waste treatment.
- The further improvement of recycling and composting systems does significantly reduce the biodegradable waste landfilled, but at insufficient levels to achieve LATS targets with recycling and composting alone.
- Only the introduction of some form of residual waste treatment facility can allow LATS targets to be met in the medium and long-term.
- The thermal treatment scenarios (scenarios 7, 8 and 9) achieve higher diversion levels of biodegradable waste than the MBT scenarios. This is due to the rejects from the MBT plants, which contain biodegradable material, which are landfilled. The EfW and

ATT facilities do not produce any biodegradable material that requires landfill disposal. Bottom ash is produced which is classed as an inert material that can either be recycled or sent to landfill without contributing to the LATS penalties.

- The MBT scenarios (scenarios 2 to 6) achieve better biodegradable waste diversion rates from landfill than Scenario 1 (Base Case), because organic material is biologically treated in order to reduce biodegradability.
- The MBT - Aerobic scenario (2) diverts lower levels of biodegradable waste compared to the other residual treatment scenarios. This is due to the larger quantity of rejects, and stabilised output being sent to landfill with this type of process. This scenario does not allow LATS targets to be met.
- The Base Case scenario (1) performs poorly at diverting biodegradable waste from landfill as only the source separated recycling and composting activities help to reduce the amount of biodegradable waste being landfilled.

The modelling has assumed that a market for the RDF produced from MBT scenario 4 can be secured. However if this fails to materialise the RDF will need to be landfilled, adding to the amount of biodegradable waste that requires landfill disposal from this type of process. Within the sensitivity analyses performed (Section 7), the impact of markets for the RDF has been addressed.

3.2 Cost of waste management

The total long-term (2010 to 2035) waste management costs have been calculated using the Discounted Cash Flow technique (DCF) to compare the costs for each scenario on a like-for-like basis. While the DCF technique is a convenient tool for comparative purposes, it is not the way in which financing for a specific project is determined (this is because issues of risk allocation to contracts, levels of debt/equity and other such factors are not considered).

For a given discount rate the gate fee is calculated to equate to the net present value of future costs (capital and operating) combined with the net present value of revenues (from power sales, recyclables). A discount rate of 6% has been used for the purposes of this analysis, which is a competitive rate, compensating for some of the development costs not explicitly included in our analysis. The discount rate chosen reflects the average cost of capital for the project; it is a real discount rate i.e. inflation has been assumed to affect all cash flows to the same extent, enabling it to be excluded from the analysis.

The modelling of costs has been conducted using the following assumptions:

- No additional costs for education initiatives have been included. However, awareness campaigns to help achieve the targets for waste minimisation and recycling/composting may add significantly to the collection costs for all scenarios, as a high recycling/composting rate is assumed for all of them.
- For the ATT scenario (9), income from ROCs[11] has been included. Even though the EfW – CHP scenario (8) would also qualify for ROCs payments, it is much more difficult to estimate how much income would be generated from CHP as a number of parameters need to be considered. Consequently, the income from ROCs could vary significantly for Scenario 8 and has been excluded from the estimated costs for this scenario. However, any potential income from ROCs would reduce the total waste management costs for Scenario 8 and this must be borne in mind when considering the data presented here.
- New residual waste treatment facilities will be fully operational in the financial year 2013/14.
- The total treatment/disposal costs include the costs for the transport of the residual waste to the management facility and the movement of rejects to landfill or products to a 3rd party.
- Landfill tax remains at £48 per tonne for active waste and £2.50 per tonne for inactive waste after 2010/11 (the 2007 budget only provided details of tax to 2010/11).
- The landfill disposal cost is £17.9 per tonne in 2007/08 and then increases up to £19.9 per tonne in 2015/16, aimed at taking into account the increasing scarcity of landfill.
- The following costs per tonne have been assumed for HWRCs, waste transfer stations, MRFs and windrow composting:
    - HWRCs = £15/tonne
    - Waste transfer stations = £16/tonne from 2006 increasing to £20/tonne from 2008
    - MRFs = £33/ tonne
    - Windrow composting = £16/tonne from 2006 increasing to £25/tonne from 2009
- RDF sent to a 3rd party incurs a cost of £75 per tonne, which has been included within the gate fees for scenario 4.
- The potential costs of not achieving the LATS targets, or the potential income generated from selling additional allowances is set at £50 per tonne for all future years.

[11] ROCs: Renewable Obligation Certificates

It is important to remember that the costs/income set for LATS are average allowance values and so actual trade values will be above and below these figures. Beyond 2019/20 the BMW target is set at the final LATS target tonnage (2019/20).

Table 3.8 presents capital costs (discounted over the typical operating life of the plant), operating costs and revenues obtained from the sale of energy and recyclable materials for the modelled residual waste treatment facilities in each scenario. The annual cost for the facility includes paying off the capital, regular maintenance costs, and transport of rejects or product. The annual costs do not include potential income or the cost to landfill of any residual waste.

Table 3.8: Capacity, estimated capital and annual operational costs for residual treatment

Scenario	Facility type	Capacity (ktpa)	Estimated capital expenditure (£m)	Annual Opex in 2015/16 (£m)	Annual revenue in 2015/16 (£m)
2	MBT-Aerobic	150	27.5	3.2	0.02
3 & 4	MBT	150	45.7	7.3	0.02
3	EfW (for RDF)	75	63.7	8.2	3.9
5 & 6	MBT-AD+Aerobic	150	56.5	3.7	0.68
6	EfW (for RDF)	19	52.2	9.1	3.5
7 & 8	EfW-CHP	150	90.5	4.3	2.1
9	ATT	150	90.0	4.4	3.2

The following additional assumptions have been made:

- Landfill – Waste is sent to the same landfill sites across Lincolnshire that are currently used by the County Council.
- No specific sites are identified within the SEA assessment, therefore a new facility is assumed to be within Lincolnshire boundaries.
- Dry recyclates are assumed to continue to go to current utilised markets, as outlined in Table 2.6, in Section 2 above.
- The RDF produced has been assumed to travel on average 50km to a 3rd party facility for combustion (for the WRATE lifecycle assessment combustion in a cement kiln has been assumed).
-

The total waste management costs are presented in Figure 3-2 for the period from 2006/7 to 2031/32. The costs include:

- Collection costs
- HWRC operation
- MRF operation
- Windrow organic waste processing
- Residual waste treatment and disposal
- Transport to treatment and transport of products and rejects
- The potential LATS penalties and income

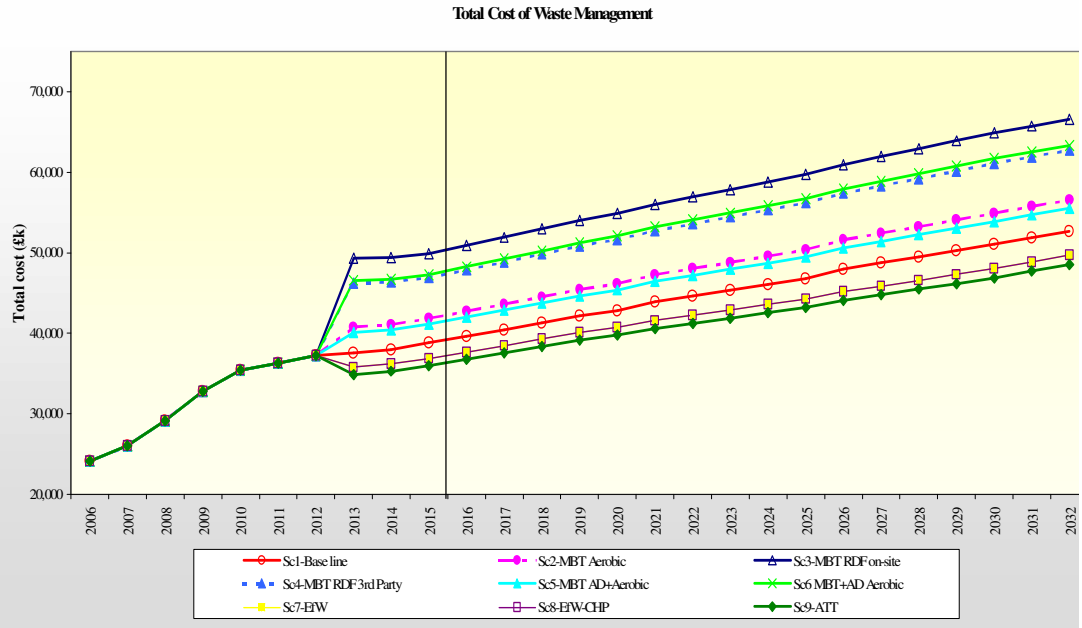


Figure 3-2: Total waste management costs (including collection and LATS)

The total costs from 2010 to 2035 (which cover the typical contract period for a treatment facility) are shown in Table 3.9.

Table 3.9: Total waste management cost (£ million) from 2010 to 2035

Scenario	Total cost (£ million)
Sc 1- Base Case	1,171
Sc 2- MBT-Aerobic	1,252
Sc 3- MBT-RDF on site	1,462
Sc 4- MBT-RDF to 3rd party	1,383
Sc 5- MBT-AD + Aerobic	1,231
Sc 6- MBT-AD + Aerobic with RDF onsite	1,395
Sc 7- EfW	1,13
Sc 8 – EfW – CHP	1,13
Sc 9- ATT Gasification	1,090

The ATT scenario (7) is presented as the least expensive option. This is due to the lower operating cost of the ATT facility, because of the additional benefits of ROCs[12] income from the energy produced. The ATT scenario also has a higher level of diversion of biodegradable waste (compared to the MBT scenarios), which results in lower landfill costs and higher income from the sale of LATS allowances until 2029/30. It should be noted that EfW - CHP scenario (8) would also attract ROCs, but this is not included in the above calculation as explained earlier. Any income from ROCs would reduce the total cost data presented here.

[12] ROC: Renewable Obligations Certificates

The EfW scenarios (7 and 8) have a relatively low cost due to high levels of diversion of biodegradable waste which results in lower landfill costs and higher income from the sale of LATS allowances.

The MBT scenarios with RDF on site (3 and 6) are the most expensive scenarios. They have the highest gate fee for a residual treatment facility and produce a significant amount of material that requires landfilling after processing, which incurs both landfill disposal and tax costs.

MBT with RDF sent to 3rd party scenario (4) has a high cost due to a relatively high gate fee which results from the high proportion of RDF material that is sent to a third party for combustion.

The MBT scenarios, which all send stabilised output to landfill, incur higher gate fees due to the relatively large amount of treated material produced needing to be sent to landfill.

The 100% landfill Base Case scenario (1) is the third least expensive option, cheaper than all the MBT scenarios.

It should be noted that there are many unknown variables that can influence the overall waste treatment and disposal cost, such as:

- Waste growth rate and whether waste reduction targets can be achieved;
- Landfill Tax increases beyond 2010/11;
- Market value and availability of LATS allowances; and
- Changes in legislation.

For example, a further increase in landfill tax rates (beyond the current maximum value of £48/tonne) will result in an increase in costs for the landfill scenario and the MBT scenarios because more biodegradable residual waste is landfilled. Thus, the cost estimates provided in the SEA, which are based on best evidence, should be seen as guidance only. The actual costs experienced by the Partnership may well be different in the future because of these variables.

4 Criteria assessment

4.1 Assessment methodology

Section 3 presented the performance against targets and costs for all scenarios. This section presents the assessment of criteria applied to environmental factors, economic factors, social factors, deliverability of scenarios and waste policy. Criteria to assess the effect of the waste strategy were defined as part of the scoping stage of the SEA and are listed in Table 2.14,

Table 2.16 and Table 2.17, in Section 2. Each criterion has been assessed by a quantitative or qualitative measure. The assessment was undertaken based on a specific year in the medium term (2015/16).

4.1.1 Measurable and non-measurable criteria

Not all criteria set for the SEA have been assigned a value in the scoring methodology for two reasons:

- Non-measurable criteria – some criteria such as 'visual impact' are not quantifiable as they are entirely subjective.
- Non-scorable criteria – some criteria, such as 'potential for business co-operation and partnership arrangements with community and charities', are potentially measurable. However, due to either the lack of data, or the quality of available data, it was decided not to score these criteria in the quantitative assessment.

The non-measurable and non-scorable criteria have been assessed using a qualitative approach, rather than a quantitative one, based on professional judgement. They have been included in the analysis of significant effects, which is presented in the next section, Section 5. Table 4.1 outlines which criteria have not been assigned a value in the quantitative assessment and the associated reasoning.

Table 4.1: Criteria not scored in the quantitative assessment

Criteria NOT scored in quantitative assessment	Comments
Environmental objectives	
To minimise the visual and landscape impact	Visual impact is entirely subjective.
Social objectives	
Potential for business co-operation and partnership arrangements with community and charities.	Some scenarios have more difficulty in achieving the recycling target as the residual treatment does not contribute to the recycling performance. Consequently more effort will be required from Lincolnshire and partners to achieve these targets. However, it is difficult to measure the effort required in relation to an achieved performance level, and this in turn depends on the initiatives set up by the Partnership with local businesses and charities.
Measurement of effort going into promotion, awareness raising and education e.g. number of school visits to promote minimisation and recycling.	The level of effort required to promote waste reduction and recycling to help achieve targets is difficult to identify. Case studies provided by WRAP outline the effort going into promotion and campaigns in specific cases, but no general guidance is available.
Deliverability of waste management option	
To assess maturity of technology, i.e. how proven/ secure it will be in the future, how effective is it and what is the risk of technology failure?	Maturity of technology depends on the status of development, its commercial use in the UK and overseas but even more on its acceptability and bankability in order to finance the waste management option.
To assess the flexibility of the waste management system to changes in future policy, waste arisings etc.	Some technologies are more flexible than others in respect of future changes in waste arisings and composition, and this is considered in the assessment.
To assess public acceptance and likelihood of achieving planning permission.	Public acceptance depends on the local area and perception of technologies.

4.1.2 Scoring methodology for quantitative assessment

The Environment Agency's WRATE software was used to assess the criteria on air, water and soil emissions, climate change, human health and resource use.

One of the limitations of all life cycle analysis (LCA) approaches, surrounds their ability to consider non-quantitative criteria (e.g. impacts on amenity value). In these circumstances, a more qualitative assessment based on judgment must be employed. As an example, the impact of the waste management infrastructure will depend on the number and type of facilities and their potential to cause nuisance. The local planning issues that need to be considered include the extent of nuisance such as noise, odour, dust, litter and vermin.

The judgement of these planning issues was carried out by ascribing performance scores to each type of treatment process depending on the type of technology and number of facilities. The scores for each planning issue have been generated by AEA through previous consultation exercises with both waste management professionals and planners, in order to derive a professional judgement on the particular facility type.

Other quantifiable values - such as total waste management costs, performance against LATS and other targets, calculation of transport impacts, amount of water consumption, land-take etc are based on the modelling of future waste arisings in Lincolnshire.

In the next step of the quantitative assessment the actual scores for each criterion have been converted to a value score by allocating a score between zero (worst performing) and one (best performing). In order to 'value' the performance of the evaluated criteria, Figure 4-1 illustrates the process of converting the criterion score to a criterion value score.

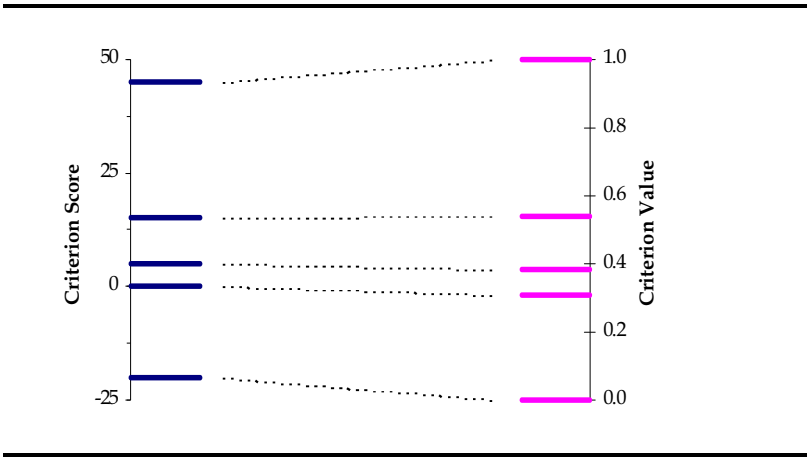


Figure 4-1: Illustration of normalising criterion scores

The conversion of the criterion score to a normalised criterion value score allows the various scenarios to be compared. By summing the normalised criterion value scores to give a total valued score, each scenario can be ranked according to performance.

The following sections present the measured scores and the normalised scores for the measured criteria, which are then used to determine the overall performance score for each scenario.

4.2 Scoring of environmental criteria

Table 4.2 presents the measured values for each environmental criterion in comparison to each scenario and Table 4.3 provides the normalised scores for these criteria. The overall performance considering all measured criteria across all scenarios is discussed below. Further detail on the scoring of each criterion is provided in Appendix A.

It should be emphasised that all results discussed in this section are based on an equal importance being placed on each criterion.

Table 4.2: Scoring of environmental objectives

	Scenario	Sc 1- Base Case	Sc 2- MBT-Aerobic	Sc 3- MBT-RDF on-site	Sc 4- MBT-RDF to 3rd party	Sc 5- MBT-AD+Aerobic	Sc 6- AD+Aerobic (RDF onsite)	Sc 7- EfW	Sc 8 EfW with CHP	Sc 9- ATT
Population and human health	Minimising noise level*	32	34	36	34	34	36	33	33	33
	Minimising extent of odour problems*	48	50	51	50	50	51	48	48	48
	Minimising extent of dust problems*	27	28	29	28	28	29	27	27	27
	Minimising extent of litter and vermin*	45	47	47	46	47	48	45	45	45
	Minimising transport impacts	3,037,628	3,592,156	3,467,492	3,592,156	3,547,882	3,518,754	3,459,332	3,459,332	3,459,332
	Minimising health impact of waste treatment	- 50,146,231	- 44,488,716	- 46,465,561	- 44,320,036	- 52,288,873	- 53,159,848	- 44,010,686	- 53,969,506	- 37,606,735
Air, water and soil	Minimising harmful emissions to water (kg PO eq.)	7,753	-11,377	- 14,292	-6,008	-2,839	-3,392	- 34,096	- 27,517	-26,819
	Minimising amount of hazardous waste produced (t)	0	0	2,493	0	0	583	3,495	3,495	3,495
	Minimising air quality impact (kg SO_2 eq.)	- 841,411	- 864,867	- 874,060	- 975,679	- 925,172	- 932,102	- 835,859	- 875,536	- 862,270
Climate change	Maximising renewable share of energy			61,833		8,738	23,185	66,060	265,638	57,438
	Minimising greenhouse gas emissions (kg CO_2 eq.)	- 101,734,763	-108,856,305	-124,788,712	-135,460,226	-126,820,410	-127,907,530	- 134,446,886	-160,328,437	-130,087,673
Resource depletion	Prudent use of land (ha)	17.84	21.76	20.95	20.95	21.12	21.05	20.28	20.28	20.28
	Prudent use of water (m^3)	0	1,165	29,214	1,165	2,330	8,884	52,429	52,429	52,429
	Prudent use of other resources (kg antinomy eq.)	-1,111,189	-1,083,529	-1,299,351	-1,708,354	-1,259,665	-1,338,336	- 1,379,266	-1,614,769	-1,335,789

* performance score based on professional judgement

PO: Phosphates

SO_2: Sulphur Dioxide

CO_2: Carbon dioxide

Antinomy: means that the depletion of "non-living" mineral and metallic resources are characterised such that their depletion may be presented as an equivalent mass of antimony

Table 4.3: Normalised score of environmental objectives

	Scenario	Sc 1- Base Case	Sc 2- MBT-Aerobic	Sc 3- MBT-RDF on-site	Sc 4- MBT-RDF to 3rd party	Sc 5- MBT-AD+ Aerobic	Sc 6- AD+Aerobic (RDF onsite)	Sc 7 EFW	Sc 8- EfW+CHP	Sc 9- ATT
Population and human health	Minimising noise level	1.00	0.47	0.07	0.52	0.50	0.00	0.66	0.66	0.66
	Minimising extent of odour problems	0.91	0.36	0.17	0.47	0.41	0.00	1.00	1.00	1.00
	Minimising extent of dust problems	0.95	0.53	0.22	0.68	0.60	0.00	0.99	0.99	1.00
	Minimising extent of litter and vermin	0.96	0.43	0.18	0.55	0.49	0.00	1.00	1.00	1.00
	Minimising transport impacts	1.00	0.00	0.22	0.00	0.08	0.13	0.24	0.24	0.24
	Minimising health impact of waste treatment	0.77	0.42	0.54	0.41	0.90	0.95	0.93	1.00	0.00
Air, water and soil	Minimising harmful emissions to water	0.00	0.46	0.53	0.33	0.25	0.27	1.00	0.84	0.83
	Minimising amount of hazardous waste produced	1.00	1.00	0.29	1.00	1.00	0.83	0.00	0.00	0.00
	Minimising air quality impact	0.04	0.21	0.27	1.00	0.64	0.69	0.00	0.28	0.19
Climate change	Maximising renewable share of energy	0.00	0.00	0.23	0.00	0.03	0.09	0.25	1.00	0.22
	Minimising greenhouse gas emissions	0.00	0.12	0.39	0.58	0.43	0.45	0.56	1.00	0.48
Resource depletion	Prudent use of land	1.00	0.00	0.21	0.21	0.16	0.18	0.38	0.38	0.38
	Prudent use of water	1.00	0.98	0.44	0.98	0.96	0.83	0.00	0.00	0.00
	Prudent use of other resources	0.04	0.00	0.35	1.00	0.28	0.41	0.47	0.85	0.40
Total		**8.67**	**4.98**	**4.11**	**7.73**	**6.73**	**4.83**	**7.48**	**9.24**	**6.40**
Ranking		**2**	**7**	**9**	**3**	**5**	**8**	**4**	**1**	**6**

Table 4.3 presents the scores of the scenarios on a non-weighted basis, it shows that the EfW - CHP scenario (8) achieves the highest environmental score and that the MBT scenarios with RDF onsite (scenarios 3 & 6) having the lowest environmental scores. The results show that:

- The Base Case landfill scenario (1) scores well in terms of minimising the potential for nuisance from noise, odour and dust because no processing plant is required (processing waste will generate noise, odour and dust). It should be noted that the good score achieved by the Base Case is explained by the fact that all the other scenarios it is compared to, also include a proportion of residual waste arising being landfilled, with all the associated impacts. Furthermore, this scenario does not require treatment of the residual waste, and so criteria such as land take and water use receive a high score.
- MBT with RDF to 3rd party scenario (4) comes third. It scores well on minimising air quality impact, prudent use of water and other resources.
- The thermal treatment scenarios (scenarios 7, 8 and 9) attain good scores in terms of minimising noise, litter and vermin. This is because no processing of the waste is required before it is combusted and no biodegradable waste arise from the process that would require to be landfilled. The three scenarios score the 2nd highest in transport terms (after the Base Case) due to less vehicle movements compared to the MBT scenarios, and low quantities of material requiring transport post treatment. The EfW scenario (7) and the EfW – CHP scenario (8) both score better than the ATT scenario (9) on minimising harmful emissions to water. Scenario 9 scores the worst overall on minimising health impacts.
- The MBT treatment scenarios (scenarios 2, 3, 4, 5 and 6) score well in terms of protecting biodiversity due to minimising the amount of hazardous waste that is produced and having low levels of greenhouse gas emissions. The scenarios additionally score well in the prudent use of water criteria, as a result of having no thermal combustion stage where potentially there may be high water usage for wet gas cleaning processes and for the steam raising plant. However they all, except MBT with RDF to 3rd party scenario (4) score much lower than the thermal treatment and the Base Case scenarios overall. In addition, the MBT scenarios with RDF onsite (3 & 6) score the lowest of all due mainly to a poor performance in the odour, dust, and vermin criteria.

Although each scenario scores well for some environmental criteria, they also score poorly for others:

- The Base Case scenario (1) scores poorly in terms of minimising greenhouse gas emissions due to landfilling of biodegradable waste (which will generate methane) and a lower level of energy recovery than most of the other scenarios. This leads to a higher level of resource depletion as any energy produced could be off-set against use of fossil fuels. This scenario also has higher impacts in terms of harmful emissions to water and air quality.
- The thermal treatment scenarios (scenarios 7, 8 & 9) score lower in terms of prudent use of water due to the potentially high use of water for flue gas cleaning and in the steam raising plant, and in terms of the amount of hazardous waste produced (which could have an impact on both land and water quality). They also perform less well for emissions to air.
- The MBT treatment scenarios (scenarios 2, 3, 4, 5,& 6) score poorly in terms of transport impacts due to large quantities of output material such as RDF, rejects and compost like output (CLO) needing onward transport once processed. The MBT processing operation also has the highest potential to generate noise, odour, dust and vermin, and the amount of CLO could result in water quality impacts from leachate once the compost product has been landfilled. The MBT with RDF to 3rd party scenario (4), scores the highest of all the MBT processes.

4.3 Scoring of other criteria

In order to compile an overall scoring of delivering the potential scenarios, criteria other than environmental ones need to be assessed. The other criteria cover economic and social factors, deliverability of the scenarios and waste policy.

Table 4.4 presents the measured values for each non-environmental measured criterion in comparison to each scenario and Table 4.1 provides the normalised scores. Further detail on the scoring of each criterion is provided in Appendix A.

Table 4.5 shows that the thermal treatment scenarios (scenarios 7, 8 and 9) achieve the highest scores. Of the MBT scenarios (scenarios 2, 3, 4, 5 and 6), the MBT with AD scenarios (scenarios 5 & 6) score the best. The Base Case scenario (1) is the lowest scoring option by a considerable margin. Others points to note:

- All scenarios receive a full score for minimising total waste arisings, as the same targets are set in each scenario.
- The thermal scenarios (scenarios 7, 8 and 9) also score well in terms of meeting the waste hierarchy and policy requirements because no biodegradable waste is landfilled, and they have high recovery levels. They also score well in overall cost terms due to having a low disposal/treatment cost for the residual waste, compared to MBT scenarios and the Base Case.
- The EfW scenario (7) and the EfW - CHP scenario (8) score the lowest, with the Base Case scenario (1) for recycling targets. All other scenarios have the potential to recycle slightly more waste through the residual waste treatment.
- The MBT with AD scenarios (scenarios 5 & 6) score well in terms of meeting the waste hierarchy and policy requirements because of the high recycling targets achieved.
- The MBT with AD scenarios (scenarios 5 & 6) score overall slightly better than the other MBT scenarios primarily due to greater recycling rates and employment opportunities. However, it should be emphasised that this performance depends on the MBT technology type and different technology providers may tender in the procurement process and offer alternative configurations to those assessed within this SEA.
- The Base Case scenario (1) receives the lowest score due to the lower number of jobs required at landfill sites compared to the jobs generated at a waste treatment facility. The scenario performs very poorly in all the waste hierarchy and policy requirements due to the reliance on landfill as the sole disposal route. The cost of the Base Case scenario is higher than that of the thermal scenarios, but is noticeably lower than all MBT based scenarios.

Table 4.4: Performance score for other measured criteria (economic objectives, social objectives, deliverability and waste policy)

	Scenario	Sc 1- Base Case	Sc 2- MBT- Aerobic	Sc 3- MBT-RDF on-site	Sc 4- MBT-RDF to 3rd party	Sc 5- MBT- AD+ Aerobic	Sc 6- AD+Aerobic (RDF onsite)	Sc 7- EfW	Sc 8- EfW+CHP	Sc 9- ATT
Economic objectives	Minimising cost of waste management (£ million)	1,171	1,252	1,462	1,383	1,231	1,395	1,113	1,113	1,090
	Maximising employment opportunities (jobs)	96	137	135	116	124	135	139	139	139
Social objectives	Opportunities for public involvement and education	338,345	338,345	338,345	338,345	338,345	338,345	338,345	338,345	338,345
Deliver-ability	Participation rate required	100%	100%	100%	100%	100%	100%	100%	100%	100%
Waste policy	Minimising total residual waste arisings (tons)	134,817	134,817	134,817	134,817	134,817	134,817	134,817	134,817	134,817
	BVPI recycling rate (Wt %)	55%	55%	55%	55%	56%	56%	55%	55%	56%
	MSW recovery rate (Wt %)	55%	59%	73%	73%	65%	68%	82%	82%	82%
	Percentage of biodegradable waste diverted from landfill (Wt %)	62%	76%	83%	83%	81%	81%	89%	89%	89%

Table 4.5: Normalised score for other measured criteria (economic objectives, social objectives, deliverability and waste policy)

	Scenario	Sc 1- Base Case	Sc 2- MBT-Aerobic	Sc 3- MBT-RDF on-site	Sc 4- MBT-RDF to 3rd party	Sc 5- MBT-AD+Aerobic	Sc 6- AD+Aerobic (RDF onsite)	Sc7 EfW	Sc 8 EfW - CHP	Sc 9- ATT
Economic objectives	Minimising cost of waste management (£ million)	0.78	0.57	0.00	0.21	0.62	0.18	0.94	0.94	1.00
	Maximising employment opportunities (jobs)	0.00	0.95	0.91	0.47	0.65	0.91	1.00	1.00	1.00
Social objectives	Opportunities for public involvement and education	0	0	0	0	0	0	0	0	0
Deliver a-bility	Participation rate required	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Waste policy	Minimising total waste arisings (tons)	0	0	0	0	0	0	0	0	0
	BVPI recycling rate (Wt %)	0.00	0.14	0.14	0.14	1.00	1.00	0.00	0.00	0.60
	MSW recovery rate (Wt %)	0.00	0.15	0.67	0.67	0.37	0.48	1.00	1.00	1.00
	Percentage of biodegradable waste diverted from landfill (Wt %)	0.00	0.53	0.77	0.77	0.71	0.71	1.00	1.00	1.00
Total		**1.78**	**3.34**	**3.49**	**3.26**	**4.35**	**4.28**	**4.94**	**4.94**	**5.60**
Ranking		**9**	**7**	**6**	**8**	**4**	**5**	**2/3**	**2/3**	**1**

4.4 Assessment before weighting

Table 4.6 presents the total score off all the measured criterion before weighting, which means that all the criteria have been given the same importance in this assessment. It shows that the thermal treatment options achieve the highest total scores.

The EfW-CHP scenario (8) is the highest ranked, primarily due to its CHP benefit, which shows an improved performance in environmental terms, particularly against a number of the WRATE criteria. This scenario also has a favourable scoring under the waste hierarchy and policy objectives because of its high recovery and landfill diversion performance.

The other thermal treatment scenarios (scenarios 7 and 9) score similarly overall but vary slightly in terms of environmental objectives. They both perform well overall due to a solid environmental performance, being less expensive than any of the other options and because they achieve the highest recovery and landfill diversion levels.

Overall the MBT scenarios (scenarios 2, 3, 4, 5 and 6) score lower than the thermal treatment technologies scenarios. The MBT with anaerobic digestion and aerobic stabilisation scenario (5), scores the best of all the MBT scenarios because of its lower costs and lower environmental impacts. Some of the MBT scenarios (scenarios 3 & 6) score well under the social objectives criteria because of the amount of energy recovered, and the number of jobs created through the extra facility required to burn the RDF onsite. Scenarios 2 and 3 are the lowest ranked scenarios overall, mainly due to their low scores in terms of environmental objectives, recycling, recovery and diversion of biodegradable waste from landfill.

The Base Case scenario (1) compares more favourably than some of the MBT scenarios such as scenarios 2, 3, and 6 in a number of the criteria, particularly the environmental ones. This is due to the fact that the stabilised output from the MBT scenarios is landfill which adds to the environmental impact in addition to the one arising from the MBT facility itself. However the Base Case scores poorly against social and waste hierarchy and policy objectives, mainly as a result of the continuing reliance on landfill.

As previously stated, the total scores in Table 4.6 have been calculated on the basis that all criteria have equal importance, and thus an equal weighting. However, this does not take into account the fact that the public and stakeholders may consider that some of the assessment criteria are more important than others within the local context of Lincolnshire. This issue was investigated at the Scoping Stage and during the public consultation. A number of stakeholders were asked to weight the criteria in terms of importance. These weightings have been used to re-calculate the total scores applying the agreed weightings.

Table 4.6: Total score before weighting

Scenario	Sc 1- Base Case	Sc 2- MBT-Aerobic	Sc 3- MBT-RDF on-site	Sc 4- MBT-RDF to 3rd party	Sc 5- MBT-AD+Aerobic	Sc 6- AD+Aerobic (RDF onsite)	Sc 7 EfW	Sc 8- EfW+CHP	Sc 9- ATT
Environmental objectives	8.67	4.98	4.11	7.73	6.73	4.83	6.94	9.24	6.40
Economic objectives	0.78	0.57	0.00	0.21	0.62	0.18	0.94	0.94	1.00
Social objectives	0.00	0.95	0.91	0.47	0.65	0.91	1.00	1.00	1.00
Deliverability	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Waste policy	0.00	0.82	1.58	1.58	2.08	2.19	2.00	2.00	2.60
TOTAL	**10.45**	**8.32**	**7.60**	**10.99**	**11.08**	**9.11**	**11.88**	**14.18**	**12.00**
Ranking	**6**	**8**	**9**	**5**	**4**	**7**	**3**	**1**	**2**

4.5 Impact on score of criteria weightings

As discussed in section 2, key stakeholders were consulted at the Scoping Stage and during the public consultation on proposed weightings for the list of criteria, as it is recognised that different issues are important to different stakeholder groups. Applying the weightings to the normalised scores generates results that are more tailored to the issues important to the stakeholders and residents in Lincolnshire.

Table 4.7 presents the total scores following the application of the weightings agreed during the consultation exercises as presented in Table 2.15. The results show several changes from the un-weighted scores. However, the EfW-CHP scenario (8) still score highest, and the MBT + on site RDF scenario (3) is the least preferable option. It should also be noted that the MBT- AD + Aerobic scenarios (5), the EfW scenario (7) and the ATT scenario (9) achieved very close scores once weighted.

Table 4.7: Total un-weighted and weighted scores

Scenario	Sc 1- Base Case	Sc 2- MBT- Aerobic	Sc 3- MBT-RDF on-site	Sc 4- MBT- RDF to 3rd party	Sc 5- MBT- AD+Aerobic	Sc 6- AD+Aerobic (RDF onsite)	Sc7 EfW	Sc 8- EfW+CHP	Sc 9- ATT
Total score with weightings	**40.34**	**35.72**	**32.73**	**42.14**	**47.80**	**41.53**	**47.73**	**55.95**	**47.54**
Ranking (with weightings)	7	8	9	5	2	6	3	1	4
Total score without weightings	**10.45**	**8.32**	**7.60**	**10.99**	**11.08**	**9.11**	**11.88**	**14.18**	**12.00**
Ranking (without weightings)	6	8	9	5	4	7	3	1	2

5 Analysis of significant effects

The scoring methodology and results of the exercise presented in Section 4 are designed to compare the scenarios against each other and in doing so, effectively rank them. However, this does not assess the subjective criteria. Consequently, all the criteria are now assessed in this section against each scenario in terms of positive, negligible or negative impacts.

Although this methodology, combined with a quantitative assessment, provides a comparison, it does not evaluate the overall environmental and socio-economic significance of the scenarios, nor determine their acceptability against defined criteria. Such an assessment of acceptability may reveal that several, or all, of the proposed scenarios are acceptable, or conversely, that even the highest scoring scenario is unacceptable.

5.1 Methodology for assessing the significance of effects

The following methodology for assessing significance was developed for this SEA:

***Stage 1- Definition of significance**:*

Under each of the generic assessment criteria groupings (e.g. social) a range of severity descriptors has been developed by which the degree of significance can be subsequently assessed. These are as follows:

- Positive (or 'beneficial')
- Negligible
- Negative: - *minor – moderate - major*

Table 5.1 to table 5.4 define the degree of significance in more detail.

Stage 2 – Apportioning significance:

Each waste management scenario is presented in a matrix in order to characterise, for each assessment criterion, the appropriate significance indicator for the impacts i.e. either: positive, negligible or negative. Negative impacts are further subdivided into minor, moderate or major, as indicated above. This is not intended to determine acceptability, but it does provide an overview of impacts and a visual comparison of all scenarios and all criteria considered (including measured and not measured criteria as discussed in Section 4).

Stage 3 – Assessing the results:

It is important to note that this methodology is not designed to identify the 'best option', rather, it presents the acceptability of a number of options against common criteria and in a transparent manner. In the case of non-measured criteria the discussion will identify any trends emerging between the nine waste management scenarios. An assessment of the results will highlight any options that are considered unacceptable on environmental and social grounds and/or as a result of stakeholder concern resulting from the public consultation exercise.

5.1.1 Stage 1 – Definition of significance

The degrees of significance of the criteria have been defined in the following tables.

Table 5.1: Degree of environmental impacts

Severity	Description
Positive	Any impacts that result in environmental improvements. These can be short- or long-term in nature and might include: Improved landscaping Reduction in emissions and discharges Energy recovery via waste treatment (e.g. AD or thermal treatment) Increased resource efficiency via the displacement of virgin material through re-use or recycling/composting. Re-use or recycling/composting (e.g. beneficial use of compost on agriculture land) No hazardous waste is generated and landfilled
Negligible	Any impacts that result in zero or no discernible environmental damage. These might include: Visual impact represented by existing facilities or new small facilities of warehouse/agricultural character with no chimney present Where water consumption is negligible due to water re-use/re-circulation Resource efficiency: limited displacement of virgin material through re-use or recycling/composting.
Negative (minor)	Slight environmental damage might include the following characteristics: Impacts are localised (within site perimeter) Impacts have a temporary (or 'short duration') and are isolated events (low probability of cumulative impacts) The effects of the impacts are reversible with (natural) recovery over a short-period of time There is zero impact on vulnerable habitats or species Potential minor effect on human health and environment if treatment technology fails to comply with regulatory limits; site improvements required Visual impact may include a small chimney on the site of the waste treatment facility No recovery of usable energy via waste treatment Resource efficiency: technology results in negligible or no displacement of virgin material through re-use or recycling/composting Water consumption is minimised with water re-use/re-circulation Very low amounts of hazardous waste are generated and landfilled

Table 5.2: Degree of environmental impacts (continued)

Severity	Description
Negative (moderate)	Moderate environmental damage which would benefit from remedial actions/ mitigation measures and would have one or more of the following characteristics: Impacts extend beyond the perimeter fence Impacts are medium-term (duration of up to 1 year) The effects of the impacts are reversible, but only in the medium-term (greater than 1 year) with some mitigation Result from cumulative effects of several (>5) minor impacts Limited impact on vulnerable habitats or species Impacts can present a nuisance to local community/individuals (<10 incidents/complaints/year) Potential moderate effects on human health and environment if treatment technology fails to comply with regulatory limits, with significant site improvements required Visual impact includes a large facility which may have a high chimney although good design and landscaping can be used to reduce the negative impact Resource consumption: technology does not support recycling and resource efficiency of material Small quantities of hazardous waste are generated and landfilled
Negative (major)	Severe environmental damage requiring remedial actions with one or more of the following characteristics: Impacts are regional (extend a number of kms from the source) Impacts are long-term (exceed a year) or permanent The effects of the impacts are not reversible and require substantial mitigation measures Result from cumulative effects of several (>5) moderate impacts; large-scale damage to common species (e.g. >5% loss of a common species) Impact to vulnerable habitat or species (e.g. Red Data Book species) Severe nuisance to local community (>10 odour incidents/year, prolonged or repeated dust problems) Potential major effect on human health and environment if treatment technology fails repeatedly to comply with regulatory limits, resulting in possible plant closure Resource consumption: technology does not support recycling and resource efficiency of materials Visual impact includes large obtrusive facility with high chimney Large quantities of hazardous waste are generated and landfilled.

Table 5.3: Degree of significance for economic and social impacts

Severity	Description
Positive	Any impacts that result in economic and social improvements - Employment opportunities - Opportunities for increasing public and business involvement in meeting waste minimisation and recycling targets
Negligible	No measurable adverse impacts
Negative (minor)	The accumulative cost of all waste management does not exceed £1,150 million for the period 2010 to 2035
Negative (moderate)	No opportunities for increasing public and business involvement in meeting waste minimisation and recycling targets The accumulative cost of all waste management is over between £1,150M and £1,350 million for the period 2010 to 2035
Negative (major)	No opportunities for increasing public and business involvement in meeting waste minimisation and recycling targets The accumulative cost of all waste management is over £1,350 M for the period 2010 to 2035

Table 5.4: Degree of significance for other project-specific criteria

Severity	Description	
Positive	Maturity of technology	Proven technology with no associated risks
	Flexibility of the technology	Fully flexible to future changes in contract and waste targets
	Public acceptance	Waste treatment infrastructure fully acceptable to the public
	Waste minimisation, recycling and recovery	Achieves all targets by 2015/16
	Waste diverted from landfill	Significantly diverts biodegradable waste from landfill exceeding 82% diversion rate
Negligible	Maturity of technology	Proven technology: good reliability and large number of reference plants operating on a similar waste stream – very low risk
	Flexibility of the technology	Flexible, but requires minor capital cost
	Public acceptance	Waste treatment infrastructure acceptable to the majority of the public
	Waste minimisation, recycling and recovery	Does not achieve targets by 2015/16: Contributes significantly to waste reduction, recycling/ composting and recovery but misses targets although it is within a reasonable range
	Waste diverted from landfill	Achieves between 77% and 82% diversion of biodegradable waste from landfill

Table 5.5: Degree of significance for other project-specific criteria (continued)

Severity	Description	
Negative (minor)	Maturity of technology	Proven technology but little experience of commercial operation in the UK
	Flexibility of the technology	Flexible, but requires moderate capital cost
	Public acceptance	Perception is that the waste treatment infrastructure may not be acceptable to the public
	Waste minimisation, recycling and recovery	Significant short-fall in achieving recovery targets by 2015/16
	Waste diverted from landfill	Achieves less than 77% diversion of biodegradable waste from landfill by 2015/16
Negative (moderate)	Maturity of technology	New technology with limited track record – moderate risk
	Flexibility of the technology	Less flexible, but requires significant capital cost
	Public acceptance	Perception is that waste treatment infrastructure is likely to be unacceptable to the public
	Waste minimisation, recycling and recovery	Small improvement on current waste minimisation, re-use, recycling/composting and recovery performance.
	Waste diverted from landfill	Significant short-fall of achieving LATS targets by 2015/16
Negative (major)	Maturity of technology	Unproven technology at development stage – high risk
	Flexibility of the technology	Inflexible; major capital cost required
	Public acceptance	Waste treatment infrastructure is not acceptable to the public
	Waste minimisation, recycling and recovery	No improvement on current waste minimisation, re-use, recycling/composting and recovery performance
	Waste diverted from landfill	Continues to landfill in future at similar levels to 2006/07 rates

5.1.2 Stage 2 – Apportioning significance

A variety of techniques can be used to present the significance of the impacts considered.

The matrix in Figure 5-1 provides an overview of significance indicators for assessing the impacts of all the assessment criteria. These are broadly categorised in terms of anticipated significance based on the professional judgement of the project team conducting the SEA, and provide a visual comparison of each scenario, independent from the scoring undertaken in Section 5. Significance is only indicative and, in reality, the actual significance or magnitude of effects is often dependent on the proximity and sensitivity of receptors to actual facilities (i.e. highly location-specific), nevertheless, it will highlight any major differences associated with the various scenarios, should they exist.

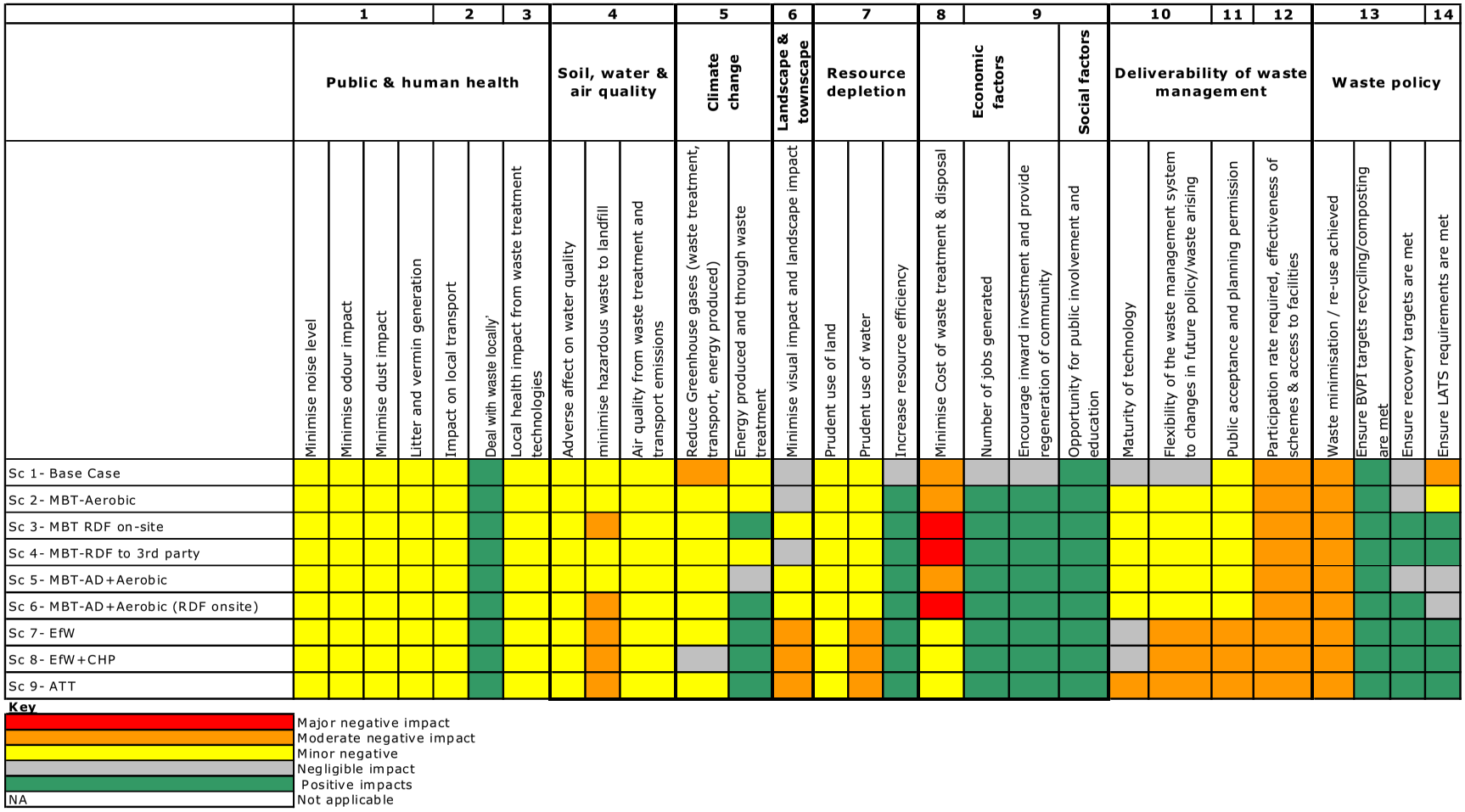


Figure 5-1: Overview of impact assessment for all scenarios

Figure 5-2 illustrates the significance of the impact for one scenario as an example. A separate matrix is provided for each scenario in Appendix C.

Whereas Figure 5-1 provides an overview of all scenarios, the individual matrices highlight specific issues and relate the significance of the effects to the scoring result for each criterion. In addition, the criteria that have not been measured in Section 4 are also assessed in the matrices and the likely degrees of significance of the impacts are shown. The apportioning of significance was undertaken for the specific scenario matrices as follows:

- Scored criteria - the degree of significance is shown for the 14 criteria categories and in relation to their normalised total scores;
- Not measured criteria – the degree of significance regarding the impact for the individual criteria are shown.

Generally, where a range of impacts are summarised under a single heading (e.g. nuisance), it is the most significant element of the summarised impact that determines the overall significance. For example, 'nuisance' is represented by a single point on the matrix but the term includes odour, noise, dust etc. In the event that odour is categorised as a major negative impact, but dust and noise as minor negative impacts, then the overall significance would be described as a major impact because the significance of odour overrides that of dust and noise. However, if the criteria category is split for example between minor or moderate negative impact, a tendency can also be shown by placing the category on the boundary.

The matrix gives a good visual representation of acceptability. Scenarios with markers towards the left of the matrix (positive impacts) are generally more preferable, both environmentally and socio-economically. In this methodology the following acceptability criteria are applied:

- Impacts falling in the 'major negative' zone are considered unacceptable and mitigation measures would be necessary to reduce the impact;
- Impacts in the 'moderate negative' zone are acceptable, but measures should be taken to minimise these impacts to the extent that is reasonable; and
- Impacts falling within the rest of the matrix are broadly acceptable and no, or only limited, action is required (although measures to promote positive impacts should be encouraged).

Figure 5-2 (and the matrices in Appendix C) illustrate that some low scoring impacts can in fact have low or negligible environmental/social impact. On the other hand, a scenario may score highly for a criteria category in comparison to the other criteria, but the impact may still be negative.

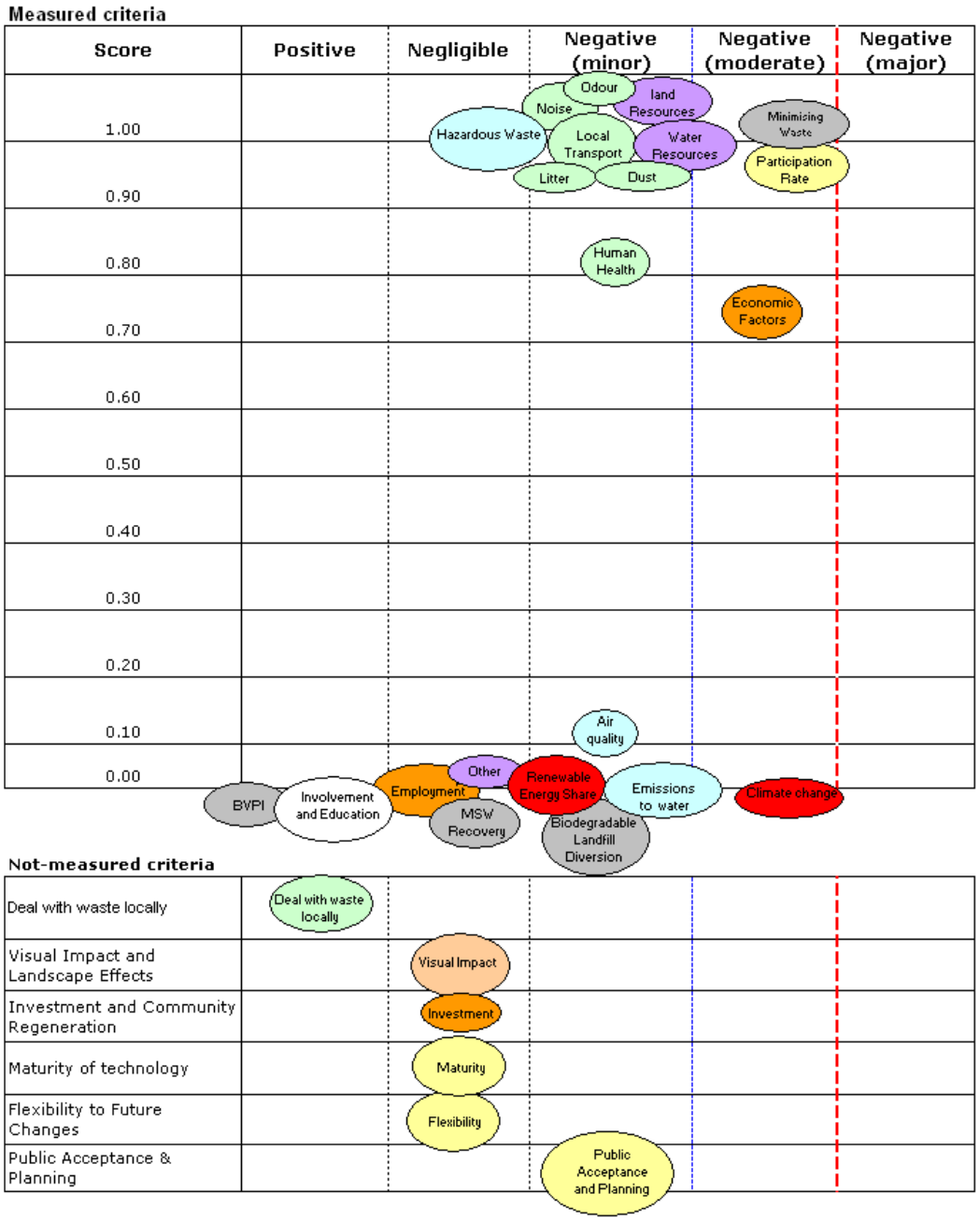


Figure 5-2: Scenario 1 Base Case – Assessment of significance

5.1.3 Stage 3 – Assessing the results

The results from the assessment show that all scenarios have some benefits, but also a number of associated issues. The right balance has to be found between accepting certain issues and gaining the most overall benefit while still ensuring that the solution is acceptable to LincoInshire's residents and the Partnership.

The following key observations can be made from the overview matrices shown in Figure 5- and Appendix C.

Major negative impacts:

- The MBT with RDF scenario (scenarios 6, 4 and 3) have one potentially major negative impact, which is cost. The estimated costs are £305M, £293M and £372 million higher respectively for the period 2010 to 2035 than the cheapest alternative scenario. These additional costs may not be acceptable to the public or the Partnership. However, it should be noted that the costs provided within this SEA are only indicative and for comparison purposes. Only through a procurement exercise can the actual costs be determined.

Moderate negative impacts:

- All scenarios have a moderate negative impact due to the reliance on public participation to achieve certain elements. Failure to achieve targets such as recycling and waste minimisation could have implications particularly regarding the residual treatment capacity of the facility and meeting landfill diversion targets.
- The Base Case scenario (1) has two additional moderate negative impacts because it fails to meet the target for diverting biodegradable waste from landfill, which consequently impacts on greenhouse gas emissions. Furthermore, the cost of the overall scenario would have a negative impact which may not be acceptable to the public and the Partnership.
- The Base Case scenario (1) has a moderate negative impact because it does not deliver sufficient diversion of biodegradable waste from landfill to achieve the LATS targets.
- The thermal treatment scenarios (scenarios 7, 8 and 9) have a moderate negative impact for hazardous waste production because of the amount of fly ash that is produced. However, treatment and/or disposal in a suitable landfill will minimise the potential for leachate affecting soil and water quality.
- Both MBT with RDF on site scenarios (scenarios 3 and 6) have a moderate negative impact for hazardous waste production because of the amount of fly ash that will be produced from the combustion of RDF in an EfW plant.
- The thermal treatment scenarios (scenarios 7, 8 and 9) also have a moderate negative impact for public acceptance and planning permission. However, with careful design, landscaping of features and consultation with the public and stakeholders this impact can be reduced. The visual impact from thermal treatment facilities can be considerable due to the presence of a chimney. However, again, with careful design, landscaping of features and consultation with the public and stakeholders this impact can be reduced.
- The thermal treatment scenarios (scenarios 7, 8 and 9) have a moderate negative impact for water usage. All treatment technologies will consume some water during processing of waste but there is potential for water re-circulation. The thermal treatment scenarios will use a much higher quantity of water than other scenarios

because of the high level of water consumption when a wet gas cleaning process is employed.

- The ATT scenario (9) has a moderate negative impact for maturity of the technology. Both landfill and EfW are well proven technologies that have been operating commercially in the UK for many years, and are thus considered to have a negligible impact. The ATT has a limited track record. This increases the risk that the technology may not be able to deliver the targets set by the waste strategy, and thus it is classified as a moderate negative impact.
- The thermal treatment scenarios (scenarios 7, 8 and 9) scenarios have one potential major negative impact in terms of the level of flexibility within the waste management system once implemented. EfW and ATT facilities require constant operation and a throughput close to their capacity to maintain good operational practice. A reduction in tonnage could impact on energy efficiency and economic performance.

All waste treatment technologies have to comply with regulatory limits and regular monitoring would be undertaken and controlled by the Environment Agency. There would therefore be no impact on human health or the environment under normal working conditions.

Minor negative impacts

- All scenarios have minor negative impacts for the following criteria; nuisance (noise, odour & dust, litter and vermin) and emissions to water.
- All scenarios have a minor negative impact for land take. Land will be required for managing waste, but the amount will be small in comparison with other demands for land, such as housing and retail facilities.
- All scenarios have a minor negative impact for human health because of the perceived health impacts due to treatment of any waste product (and a resulting higher level of public opposition to such a facility). However, there should be no impact on human health if the combustion facilities comply with regulatory limits and it should be emphasised that all waste management facilities, including thermal treatment, are strictly controlled and regulated by the Environment Agency
- All MBT scenarios (scenarios 2, 3, 4, 5 and 6) have a minor negative impact for flexibility of the waste management system as they are likely to adapt slightly better than EfW and ATT technologies to change, particularly with regard to quantities of residual waste.
- The MBT scenarios (scenarios 2, 3, 4, 5 and 6) have a minor negative impact for maturity of the technology. The MBT technologies have proven operational facilities in a number of European countries, but there are a lower number of established plants in the UK. This increases the risk that the technology may not be able to deliver the targets set by the waste strategy, and thus it is classified as a minor negative impact.
- All scenarios have a minor negative impact regarding obtaining planning consent because of the likely public perception of new waste treatment facilities.
- All the scenarios have a minor negative impact for local transport despite some variation in total movements. The impact is likely to be small when compared to other traffic movements. The potential impacts on congestion would be reduced if the majority of traffic movements occurred when the level of other traffic was lower.
- The MBT-Aerobic scenario (2) has a minor negative impact for meeting LATS has is fell short of meeting the 2020 LATS target.

Negligible impacts

- The negligible impacts are predominantly assigned to the Base Case scenario (1) due to minimal changes occurring and consequently limited impact on any of the criteria.
- The EfW – CHP scenario (8), has a negligible impact on greenhouse gas emissions, because minimal amounts of waste are sent to landfill compared to other scenarios, and due to the higher energy efficiency.
- The Base Case scenario (1), the MBT-Aerobic scenario (2) and the MBT – RDF to 3rd party scenario (4) all have a negligible visual impact due to the simpler plant layouts and design features.
- The MBT – AD with Aerobic scenario (5) and MBT- AD + Aerobic (RDF on site) scenario (6) have a negligible impact for meeting the LATS targets. Both scenarios meet the 2020 LATS target, but don't meet the BMW diversion required as of 2023.
- The MBT scenarios (scenarios 2, 3, 4, 5 and 6) and the Base Case scenario (1) have negligible impact for hazardous waste as none is generated by the processes.

Positive impacts:

- All scenarios except the Base Case scenario (1) have positive impacts for the following criteria: prudent use of resources; waste recovery and biodegradable waste diversion from landfill. These are all related since diverting biodegradable waste from landfill often entails some form of recovery, which lessens the impact on resources.
- All the scenarios except the Base Case scenario (1) have a positive impact for maximising employment opportunities because treatment plants will create more employment opportunities.
- All the scenarios have a positive impact for recycling, households provided with collection schemes, promotion of waste management activities and waste minimisation.

In summary, the Base Case scenario (1) has four impacts that are classified as moderately negative and it also has the fewest positive impacts. The MBT with RDF onsite scenario (3), the MBT with RDF to 3rd party scenario (4) and the MBT with AD and RDF onsite scenario (6) have one major negative impact due to the increased costs of waste management. The ATT scenario (9) shows the highest number of moderately negative impacts.

6 Compatibility assessment

The SEA Directive does not require an assessment of compatibility of the assessment objectives, but it is good practice to test the internal compatibility of SEA. There may be tensions between certain objectives and the compatibility assessment will highlight these problems. This will enable mitigation measures or alternatives to be considered, and thus will help to ensure that subsequent decisions for future waste management in Lincolnshire are well founded.

There are a total of 28 criteria within 14 main categories. In order to simplify the assessment, it was conducted by comparing each of the 14 main categories against each other. The normal procedure for conducting the assessment is to determine whether the two criteria being compared are either compatible, in conflict, or there is no relationship between them. Examples for each classification are shown below:

- *Compatible* – a criterion is compatible with the criterion it is being compared against (e.g. increasing recycling is compatible with diverting waste from landfill).
- *No relationship identified* – There is no easily identifiable relationship between two criteria. For example, there is no relationship between tackling climate change and minimising nuisance from dust and odour.
- *In conflict* – A criterion is in conflict with the criterion against which it was being compared. For example, dealing with waste locally would result if all facilities were located close together, however, this closeness could increase the local visual impact caused by the facilities.

As the 28 criteria are grouped into 14 categories there is a risk that conflict or compatibility might occur between the different criteria in one grouping. Consequently, two further relationships; 'partly compatible' and 'potential conflict', were also used to conduct the assessment.

Figure 6-1 presents the results of the compatibility assessment. This overview indicates that generally the majority of criteria do not impact on each other. The key findings are:

- The criterion achieving the highest number of compatible scores is 'maximising public acceptability', mainly because tackling climate change or minimising the cost of waste treatment would make the strategy more acceptable to the public. However, maximising public acceptability would be in conflict with minimising dependence on public involvement, because many residents and community and interest groups like to be involved and promote waste minimisation, re-use and recycling/composting. Consequently, a lower need to involve the public in certain areas of waste management may result in lower public acceptability of the strategy.
- The criteria for meeting targets (reduction, re-use, recycling / composting and landfill diversion) are compatible with reducing emissions of greenhouse gases, providing employment opportunities, maximising regeneration of local communities and public behaviour change. However, there are also some conflicts and potential conflicts as there will be a higher level of risk in meeting these targets if the high level of public involvement required is not achieved. Visual impact may potentially be in conflict with higher recycling/composting levels, because more facilities are required although the visual impact from potentially smaller residual treatment facilities also needs to be taken into account. In addition, higher levels of recycling/composting will result in a higher transport impact, which, however, may be mitigated if local reprocessors can be identified.

- There is compatibility between increasing opportunities for employment and meeting recycling targets. However, increasing the number of waste management jobs by collecting more waste from the kerbside and having more waste treatment and disposal facilities will increase overall waste management costs.
- Considering the environmental criteria alone there are some compatibilities and some potential conflicts. Minimising the impact on air quality will reduce emissions and this is compatible with minimising local health impacts from waste treatment plants. However, reducing transport will require all facilities to be in the local area, which will increase both the local visual impact of the facilities and increase the potential health impacts from the waste treatment plants because of the closer proximity to residents.
- The total cost of waste management is generally compatible with meeting targets of waste reduction, recycling/composting and landfill diversion. However, it should be noted that this compatibility would change into conflict if the targets cannot be met. If targets are not met, the residual treatment capacity may not be sufficient in the future and additional landfill allowances would need to be purchased. On the other hand, the cost of waste management is in conflict with maximising opportunities for public behaviour change, because education and promotional campaigns need much investment (financial and time) over a long period to raise and keep public awareness high. Furthermore, waste treatment costs are also in conflict with the flexibility of technologies and services. EfW plants may be cheaper in the long-term as they provide the security of landfill diversion. However, thermal treatment plants are less flexible to changes in waste arisings or targets.

Compatible
Partly compatible
No relationship identified
N/A
Potential conflict
In conflict

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
		Minimise nuisance from noise, odour, dust, litter and vermin generation	Minimise local transport movements	Minimise local health impact from waste treatment technologies	Minimise impact to soil, water & air quality	Tackle climate change by minimising GHG emissions	Minimise visual impact	Maximise resource efficiency through prudent use of land, water & resources	Minimise cost of waste management	Maximise economic and social benefits	Minimise risks through ensuring the maturity, effectiveness and flexibility of technology	Maximise public acceptability and planning permission	Minimise dependance on public involvement considering health and safety	Meet targets for reduction, re-use, recycling & composting, and recovery	Meet targets for diverting biodegradable municipal waste from landfill
1	Minimise nuisance from noise, odour, dust, litter and vermin generation	N/A													
2	Minimise local transport movements		N/A												
3	Minimise local health impact from waste treatment tecnologies			N/A											
4	Minimise impact to soil, water & air quality				N/A										
5	Tackle climate change by minimising GHG emissions					N/A									
6	Minimise visual impact						N/A								
7	Maximise resource efficiency through prudent use of land, water & resources							N/A							
8	Minimise cost of waste management								N/A						
9	Maximise economic and social benefits									N/A					
10	Minimise risks through ensuring the maturity, effectiveness and flexibility										N/A				
11	Maximise public acceptability and planning permission											N/A			
12	Minimise dependance on public involvement considering health and safety												N/A		
13	Meet targets for reduction, re-use, recycling & composting, and recovery													N/A	
14	Meet targets for diverting biodegradable municipal waste from landfill														N/A

Figure 6-1: Compatibility assessment

7 Sensitivity analysis

In a report of this nature data must be projected (e.g. annual waste growth, waste composition, growth in household numbers) with no absolute certainty of the outcome,, particularly given the medium to long-term timelines. As a result it is important to analyse the overall sensitivity of each scenario to future possible changes in key variables. The sensitivity analysis approach adopted alters one variable at a time and thereafter analyses the resulting change. In this manner the waste strategy can be monitored and reviewed by the Partnership to ensure its continuing relevance.

In the following sections sensitivity analysis has been conducted on the following:

- Impact of having an overall waste growth of 2.25% instead of 1.7%,
- Issues around securing a market for RDF material,
- Market value of landfill allowances,
- Not fulfilling existing landfill contract.
- Impact of collecting kitchen waste

7.1 Sensitivity – 2.25 % overall waste growth

The strategy assumed an overall growth in waste generation of 1.7% as a result of the number of additional households established in Lincolnshire from 2007 to 2020 plus waste growth per household. However, a growth of 2.25% per annum is reflected in recent trends in growth in consumer spending. In order to test the sensitivity of having a different overall waste growth the assumptions have been set as shown in Table 7.1.

Table 7.1: Assumptions of waste growth in SEA modelling and sensitivity analysis

	SEA modelling	Sensitivity analysis
Period	**Overall growth rate**	**Overall growth rate**
2007/08 – 2039/40	1.7%	2.25%

Table 7.2 represents the costs for the new assumptions; it indicates a significant growth in total waste management costs for all scenarios. The increase shown is mainly due to the costs of more waste being landfilled, on the assumption that the residual waste treatment facilities are unable to accept the progressively higher volumes of material. Collection cost may increase as well as more waste than anticipated needs to be collected, although this depends also on the efficiency of the collection scheme and may not show a significant effect.

Table 7.2 indicates that in these circumstances all scenarios show an increase in the overall waste management costs of between approximately £68 and £86 million for 25 years (from 2010 to 2035) compared to the standard scenarios. In general, the following observations can be made:

- The scenarios keep the same order in terms of expenditure costs compared with the overall waste growth used in the SEA modelling;
- The costs in Scenario 1 Base Case increase more significantly compared to other scenarios since the overall waste growth has a larger impact on the residual waste sent to landfill, which increases the costs from LATS penalties.

Despite the higher cost increase compared to other scenarios the assessment still indicates the lowest overall costs for the thermal treatment options.

Table 7.2 Potential impact of increased waste growth on total waste management costs for the period 2007 to 2035

Scenarios	Total Cost (£ million) Waste growth 1.7%	Total Cost (£ million) Waste growth 2.25%	Variation %
Sc1-Base line	1,171	1,252	6.83%
Sc2-MBT Aerobic	1,252	1,335	6.54%
Sc3-MBT RDF onsite	1,462	1,546	5.60%
Sc4-MBT RDF to 3rd Party	1,383	1,470	6.21%
Sc5-MBT AD + Aerobic	1,231	1,311	6.33%
Sc6-MBT AD + Aerobic (RDF onsite)	1,395	1,479	5.95%
Sc7-EfW	1,113	1,184	6.19%
Sc8-EfW-CHP	1,113	1,184	6.19%
Sc9-ATT	1,090	1,159	6.23%

The impact of a 2.25% annual waste growth would impact on the amount of BMW arising and requiring treatment. Figure 7.1 presents the BMW diversion from landfill for each scenario. It shows that a number of scenarios would fall short of meeting the LATS target for 2020. It is the case for the scenario (5) MBT – AD + Aerobic and scenario (6) MBT+AD Aerobic, and as before Base Case scenario (1) and scenario (2) MBT + Aerobic.

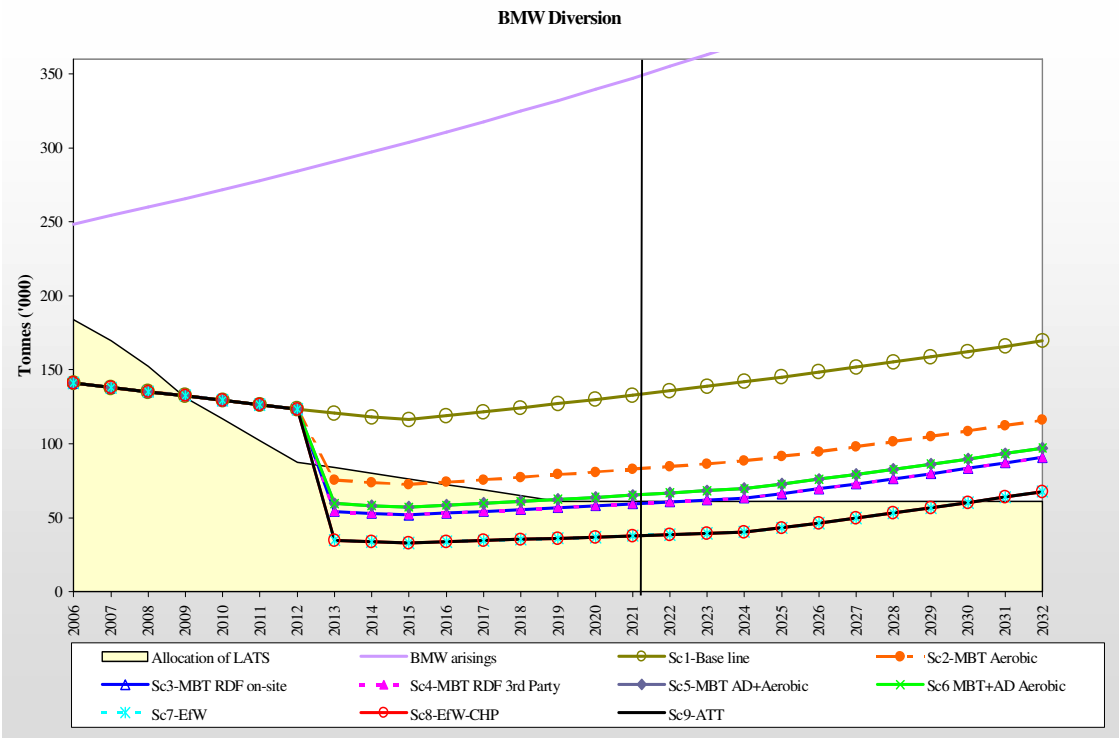


Figure 7-1: Impact of increase waste growth on BWM diversion from landfill

7.2 Sensitivity – Securing of markets for RDF

Scenario 4 MBT with third party RDF relies on a secure market for the RDF being found. However, there are uncertainties about securing a long-term market for the RDF material which must be considered.

If it is not possible to secure a 3rd party market to take the RDF material, then it will have to be landfilled. The additional material being landfilled would affect meeting Lincolnshire's BMW landfill diversion target, achievement of the LATS allowances and consequently impact on costs and professional reputation. It has been assumed that the RDF material would have a 68% biodegradable content based on a mixture of paper, plastics, and some organics. .

Figure 7-2 illustrates the revised landfill diversion performance if the RDF material from Scenario 4 was landfilled due to unavailability of outlets. This shows a significant rise in the biodegradable waste landfilled compared to the standard Scenario 4 and it would not meet the LATS allowances at any time if the RDF were to be landfilled.

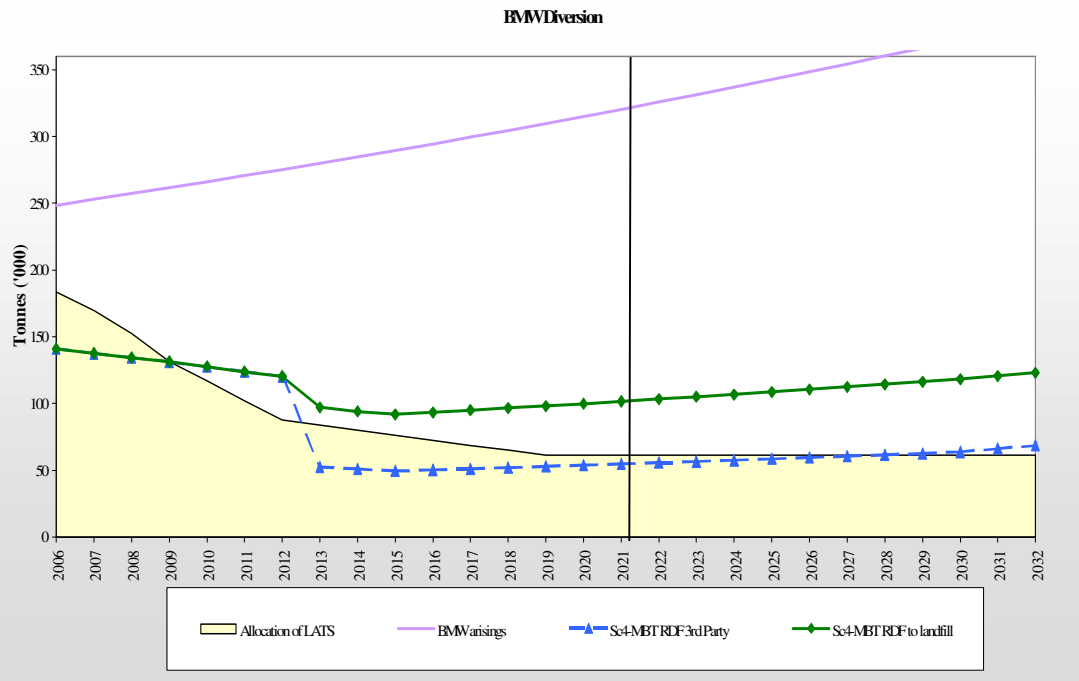


Figure 7-2: Sensitivity analysis - revised landfill diversion analysis with RDF to landfill

The impact on the treatment and disposal cost of landfilling the RDF material is shown in Figure 7-3 and Table 7.3. It should be noted that the costs of landfilling in the SEA modelling does not change for landfill tax (remains at £48/tonne beyond 2010/11) and the LATS market value was set at an estimated £50/tonne for all years (continuing with the same LATS allowances as set for 2019/20). However, the Government may increase Landfill Tax beyond 2020/11 or the LATS targets may decrease further in future (beyond 2019/20).

Table 7.3: Annual cost depending on RDF end use (£k per year)

Scenario	2012 – 2016	2017 – 2021	2022 - 2026	2027 - 2031	2032 - 2036
Sc4 MBT RDF to 3rd Party	224,046	253,954	276,965	300,673	322,161
Sc4 MBT RDF landfilled	230,637	263,062	287,601	312,827	334,559
% Change between the scenarios	2.94%	3.59%	3.84%	4.04%	3.85%

Scenario 4 increases in cost due to increased LATS costs and the additional landfill disposal and Landfill Tax cost.

The decision to landfill or secure a 3rd party market for the RDF depends on the right balance of 3rd party gate fee, cost of landfill disposal and tax and the predicted LATS performance. This needs to consider the costs of purchasing LATS as well as the potential income from sale of surplus LATS allowances (the same market value has to be assumed for purchasing and selling LATS in this SEA modelling). Furthermore, the council's determination to avoid landfill where possible also needs to be taken into account. Public perception could be that where material was landfilled, this would also represent a waste of resources.

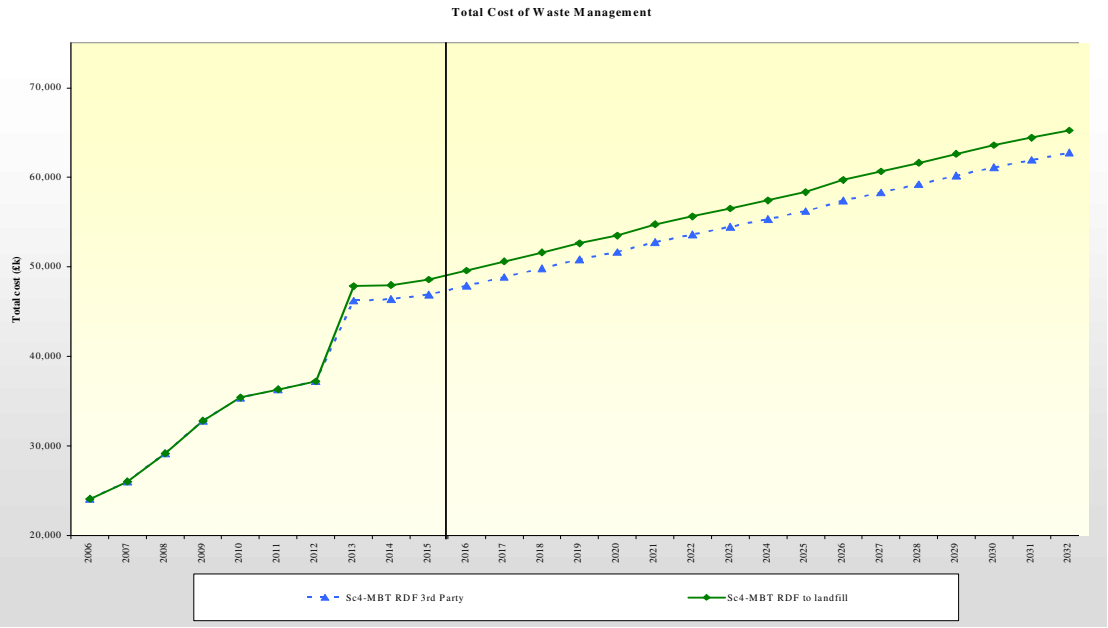


Figure 7-3: Sensitivity analysis - disposal costs with RDF sent to landfill

7.3 Sensitivity – Market value of landfill allowances

An underlying assumption of the modelling is the notional value of the tradable landfill allowance. This is difficult to estimate, because the value of allowances depends on how well other authorities achieve their diversion targets and therefore impacts on how the market will develop.

Most local authorities are expected to meet their landfill allowances in the short-term (up to 2009) through increased recycling, and borrowing and banking of allowances, hence the value is likely to be low due to less demand until 2009. In the medium term (2010-2013) landfill allowances may become more valuable as many authorities are likely to have difficulties implementing their plans for new residual treatment facilities within the required time scale and when LATS allocations are reducing substantially. Trading and landfill allowance values are likely to reduce in the long-term (2013-2020), because most authorities will plan to meet these targets and will introduce the facilities required in order to reduce the cost impacts. A notional allowance value of £50/tonne has been assumed in this modelling.

A sensitivity analysis has been undertaken to show the impact of different LATS values on the total costs of waste management (cumulative cost 2010 to 2035). In this analysis, the tradable value of landfill allowances varied between £0/tonne up to the maximum of £150/tonne as shown in

Figure 7-4. The same value has been assumed for buying and selling of landfill allowances.

Figure 7-4 indicates that the Base Line and MBT scenarios become more expensive with increasing LATS values. Only the thermal treatment scenarios (7, 8 & 9) show a decrease in their costs due to the additional income from selling LATS allowances in future.

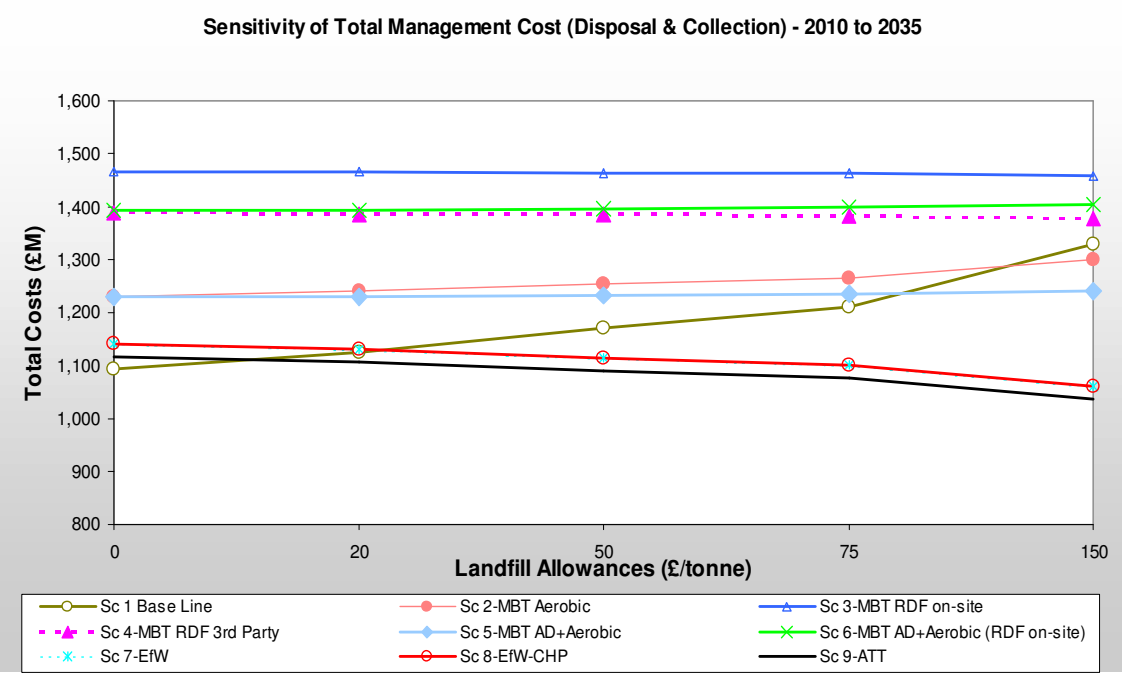


Figure 7-4: Total waste management costs under variations of LATS values

7.4 Sensitivity – Not fulfilling existing landfill contract

Under current contractual arrangements Lincolnshire County Council is obligated to deliver a specific quantity of waste to landfill sites in the county. These tonnages have been taken into consideration in the modelling.

A sensitivity analysis has been undertaken to show the impact of sending some of those tonnages to the residual treatment facility instead. Table 7.4 presents the costs for the different scenarios taking into account the new destination for some of the residual waste. They all show a decrease in total costs of between £2 and £10 million. Obviously this change does not affect scenario 1 which reflects the landfill only scenario.

Table 7.4: Total waste management costs ignoring current landfill contract against fulfilling current landfill contract

Scenario	Fulfilling LFc (£ million)	Ignoring LFc (£ million)
Sc1-Base line	1,171	1,171
Sc2-MBT Aerobic	1,252	1,246
Sc3-MBT RDF onsite	1,462	1,457
Sc4-MBT RDF to 3rd Party	1,383	1,379
Sc5-MBT AD+Aerobic	1,231	1,224
Sc6-MBT AD+Aerobic (RDF onsite)	1,395	1,390
Sc7-EfW	1,113	1,103
Sc8-EfW-CHP	1,113	1,103
Sc9-ATT	1,090	1,078

7.5 Sensitivity - Implementing kitchen waste collection

Kitchen waste represents a noticeable proportion of household waste, and the Waste Strategy 2007 identify it as a waste that local authorities need to pay particular attention to how it is collected and managed as it will contribute to England meeting its national LATS targets.

WRAP has published a number of reports on kitchen waste collection and has funded a number of pilot collections across the country. The main findings from WRAP are that two variables will significantly impact on the success of a kitchen waste collection service

- Separate kitchen waste collection or co-mingled kitchen/garden waste
- Residual waste collection frequency

The better combination appears to be a weekly separate kitchen waste collection with a fortnightly residual waste collection as outlined in WRAP's Guidance[13].

The introduction of a kitchen or food waste collection could affect the performance of the scenarios studied in the report. This section summarises the variations on the results in one of the best scoring scenarios, Scenario 7, EfW, as a result of the introduction of kitchen waste collection.

Two different options for collecting source-separated kitchen waste are considered:

- Weekly collection of separate kitchen waste
- Fortnightly collection of kitchen waste mixed with green waste

The frequency of residual waste and dry recycling collection in each district is assumed to be the same as in 2006.

For the treatment of kitchen waste, Lincolnshire County Council will need to procure, at least, one In-Vessel Composting facility. For the modelling to take into consideration transport, the location of the IVC had to be speculated. From conversation with LCC, it was agreed that the model should assume LCC procuring one IVC, which would be located at MEC Recycling in Swinderby (Lincoln).

Since the second option considers a collection of both green and kitchen waste together, the green waste has to be treated as kitchen waste in compliance with the Animal By-Product Regulations. For this option all the green and kitchen waste is assume to be sent to the IVC plant, with the exception of the green waste from the HWRC sites that is still sent to the Windrow Composting facilities throughout the County.

Several assumptions are applied in the model.

For the first option (separate kitchen waste) these are:

- Kitchen waste collection will be introduced in 2013 across the county.
- 100% household coverage.
- 60% participation rate achieved across the county.
- 26% composition of the total household waste as kitchen waste based on ELDC study. This is a relatively high percentage compare to the 19% used by WRAP, thus a sensitivity model was run using 19% matching national figures[14].

[13] Food Waste Collection Guidance, ROTATE WRAP.
[14] Personal conversation with WRAP, 19% is based on the review of in excess of 100 waste compositional analysis funded through DEFRA.

For the second option, the assumptions are:

- Kitchen waste will be introduced in 2013.
- For districts currently collecting green waste, the number of households covered remains the same.
- South Kesteven increases its green waste coverage by an additional 6,500 households by the summer 2008 to bring the total number of households on green waste collection to 25,000 by end of 2008.
- Boston and South Holland also introduce a fortnightly green and food collection to all their households.
- The location of the IVC will require some Councils to deliver directly while others will deliver via existing transfer stations. Lincoln and North Kesteven will deliver direct; West Lindsey will transfer at Caenby Corner, East Lindsey at Louth, South Kesteven at Grantham whereas Boston and South Holland will transfer at Boston.
- 40% participation rate
- As in the first option, 26% of the total waste composition is considered kitchen waste based on ELDC study. A sensitivity model has also been run using the national for kitchen waste in household waste of 19%.
-

7.5.1 Modelling of separate kitchen waste collection

The model incorporates kitchen waste collection applying the following methodology:

- Firstly, it calculates the amount of kitchen waste collected in each of the districts by multiplying the total household waste arisings in the district by the participation rate and by the percentage of kitchen waste composition assumed.
- The tonnage of kitchen waste diverted is then subtracted from the residual waste to landfill.
- The amount of kitchen waste divided by the number of households receiving the collection and the number of weeks in a year (52) shows the Kg per household per week. Table 7.5 presents expected yield of kitchen waste collected per household per week for each of the local authorities in 2015.

It shows that:

- Systems capturing kitchen waste only achieve, in general, higher collection rates than systems capturing kitchen and green waste together.
- The kitchen waste only system would divert 51,530 tonnes of kitchen waste in year 2015, compared with 25,570 tonnes of kitchen waste collected with garden waste using a 26% kitchen waste composition
- When using the 19% composition scenario, the difference in the amount of waste diverted would be noticeable. Thus for a kitchen waste only system 37,660 tonnes would be diverted, compared with 18,690 tones for a combined kitchen and garden waste system.

Table 7.5: Collection levels in 2015

	26% comp KW only	19% comp KW only	26% comp KW & GW	19% comp KW & GW
Boston				
No households with kitchen waste	29,320	29,320	29,320	29,320
Kg/household/week	2.8	2.1	1.9	1.4
East Lindsey				
No households with kitchen waste	68,636	68,636	62,530	62,530
Kg/household/week	2.8	2	1.8	1.3
Lincoln				
No households with kitchen waste	44,162	44,162	30,835	30,835
Kg/household/week	3	2.2	2	1.4
North Kesteven				
No households with kitchen waste	51,239	51,239	48,289	48,289
Kg/household/week	3.4	2.5	2.2	1.6
South Holland				
No households with kitchen waste	41,954	41,954	41,954	41,954
Kg/household/week	2.7	2	1.8	1.3
South Kesteven				
No households with kitchen waste	62,146	62,146	27,731	27,731
Kg/household/week	2.9	2.2	2	1.4
West Lindsey				
No households with kitchen waste	42,316	42,316	13,000	13,000
Kg/household/week	3	2.2	2	1.4

7.5.2 Performance of kitchen waste collection options

Rates for recycling and composting, recovery and biodegradable waste diverted from landfill for each of the four sensitivity options are compared against the scenario without kitchen waste collection in Table 7.6:

Table 7.6: Recycling, recovery and BMW diversion rates achieved by each option in 2015 (Wt %)

Scenario	Recycling and composting	Recovery (MSW)	BMW Diversion
Sc 7- EfW	**55%**	**82%**	**89%**
Sc 7- EfW with KW (26% comp)	67%	85%	97%
Sc 7- EfW with KW (19% composition)	64%	84%	95%
Sc 7- EfW with KW+GW (26% comp)	60%	83%	92%
Sc 7- EfW with KW+GW (19% comp)	59%	83%	91%

Table 7.6 shows that:

- Systems collecting kitchen waste only have higher diversion of biodegradable waste from landfill than systems collecting kitchen and green waste together.
- The countywide recycling rate would be improve by at least 5% with a kitchen and garden waste collection and by 12% for a kitchen only system (at 26% composition)
- As it could be expected, options considering kitchen waste as 26% composition of the total waste achieve higher diversion rates than the same collection systems at 19%.

The same findings can be observed in Figure 7-4, it shows the projected impact each option will have on the Partnership's ability to meet landfill diversion targets in the future.

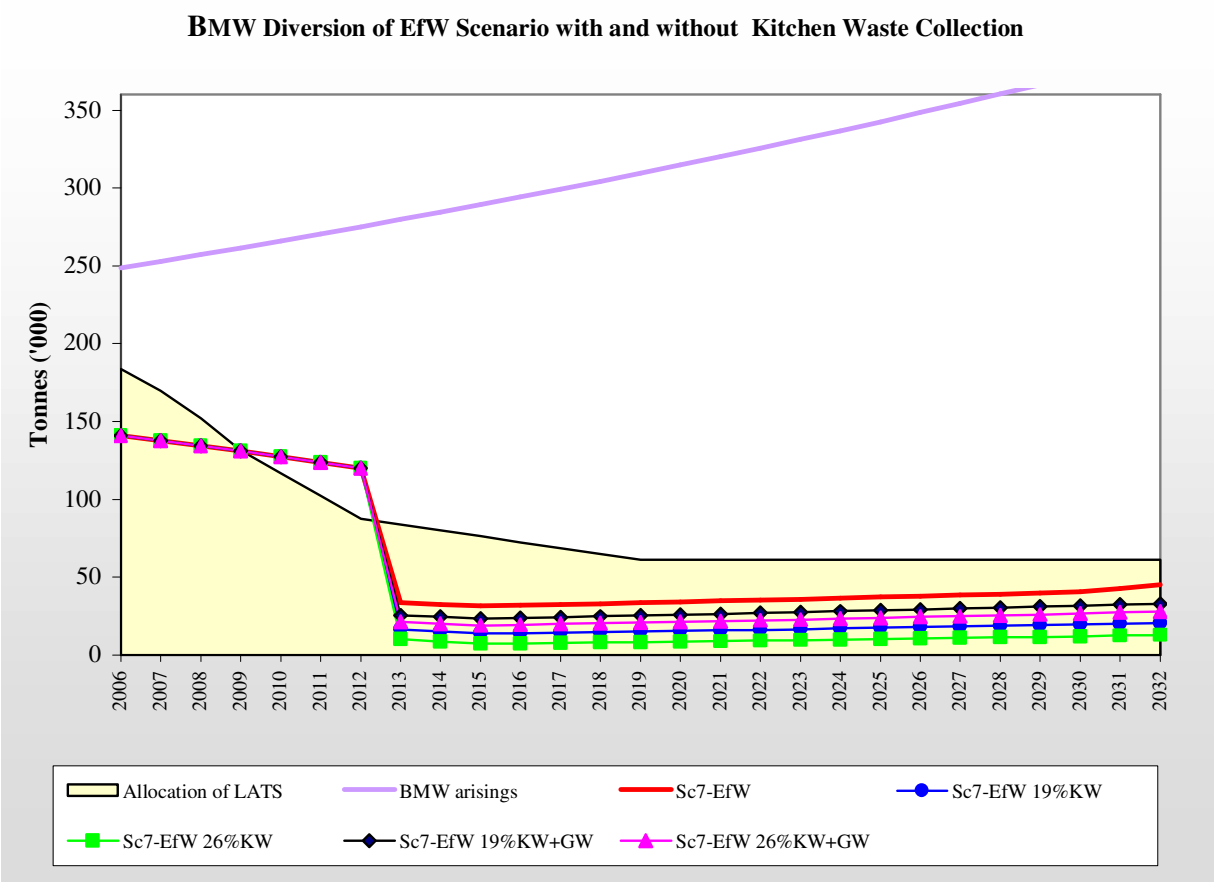


Figure 7.4: Landfill diversion of biodegradable municipal waste with a kitchen waste collection

7.5.3 Management cost of kitchen waste collection options

The total cost of the waste management system will be affected by the introduction of kitchen waste collection. The total costs for the different options from 2010 to 2035 are shown in Table 3.9

Table 7.7: Total waste management cost (£ million) from 2010 to 2035

Scenario	Total cost (£ million)
Sc 7- EfW	1,113
Sc 7- EfW with KW (26% comp)	1,187
Sc 7- EfW with KW (19% composition)	1,199
Sc 7- EfW with KW+GW (26% comp)	1,174
Sc 7- EfW with KW+GW (19% comp)	1,181

Table 7.7 shows that:

- Systems collecting kitchen waste only on a weekly basis are more expensive than systems collecting green and kitchen waste together on a fortnightly basis.
- Systems considering kitchen waste as 19% composition of the total waste are more expensive than the same systems at 26%.
- In all cases, it is more expensive to collect kitchen waste than no to collect it

The same waste management costs between options can be seen in Figure 7-3.

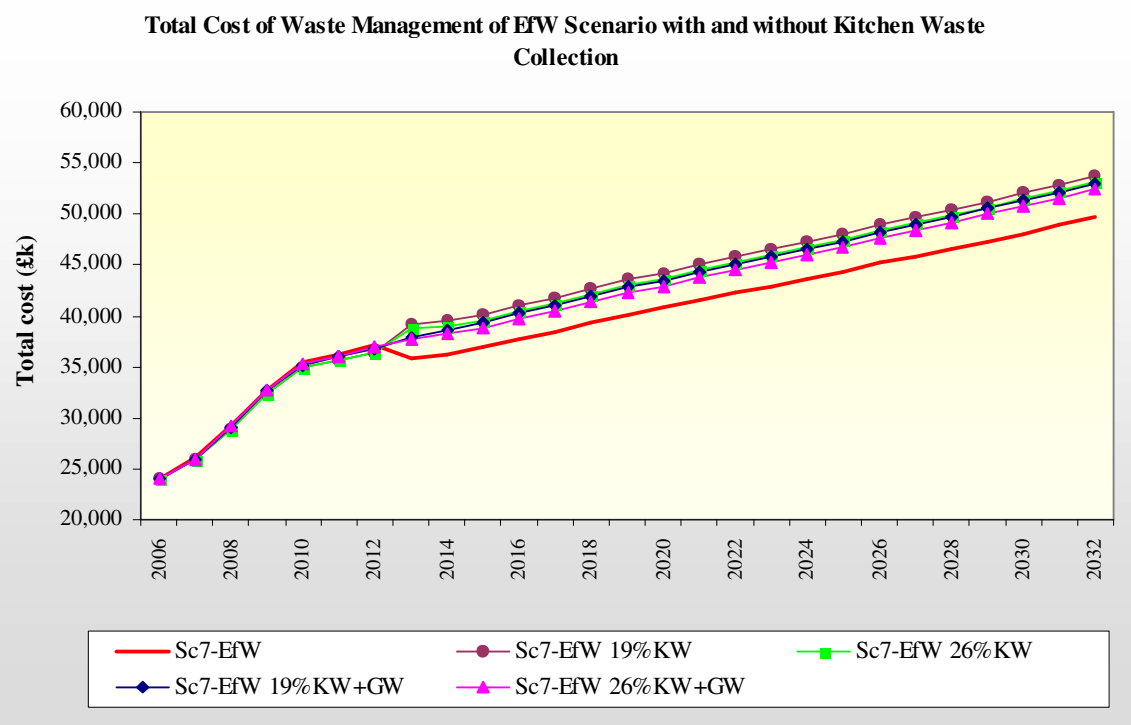


Figure 7-3: Total waste management costs (including collection and LATS)

Lastly, the sensitivity analysis considered the impact a kitchen waste would have on the Base Case scenario (1) which relies on 100% landfill to disposal of all residual waste arisings. As it can be seen in Figure 7-4 the implementation of either kitchen waste collection will not allow the County to meet its LATS targets in 2013.

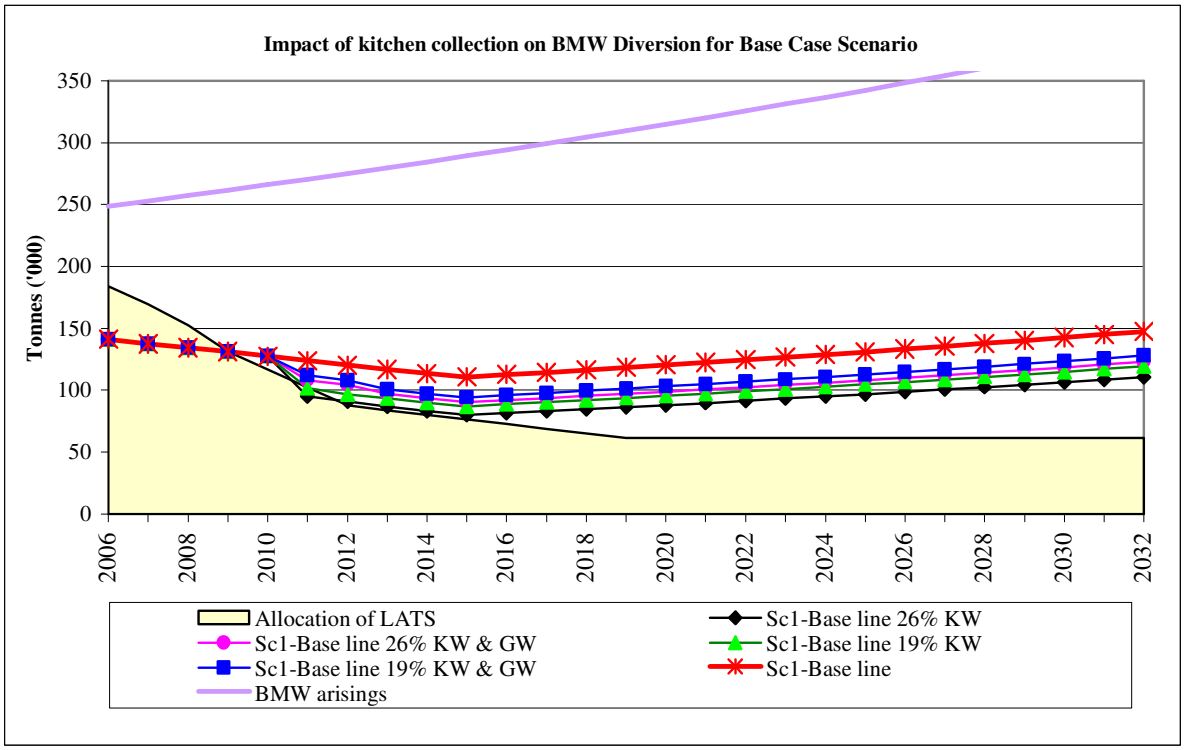


Figure 7-4 Impact of kitchen waste collection on Base Case scenario (1).

In summary, the main findings of this sensitivity analysis concentrating on kitchen waste are:

- Recycling, recovery and BMW diversion rates are higher when there is a kitchen waste collection in place. Systems with kitchen waste collected separately from green waste achieve higher diversion rates than those with kitchen and green waste together.
- The introduction of kitchen waste collection will involve extra costs for each of the districts and for the County Council. However the higher recycling, recovery and BMW diversion rate would not achieve any financial benefits, as the scenario without kitchen waste would meet both recycling and LATS targets anyway, however the environmental incentive will need to be taken into consideration.
- When collecting green and kitchen waste together, green waste has to be treated as kitchen waste increasing the costs of processing it. However, the collection costs for an extra collection service of kitchen waste make it more expensive than combining it together with garden waste. As a result, the option with kitchen waste collection only is more expensive than the collection of kitchen and green waste together.
- The same report by WRAP asserts that collection of kitchen waste and green waste in the same container is, in general, beneficial if a local authority has to cover a widespread geographical and rural area.

If a decision were taken to investigate the possibility of introducing a kitchen waste collection service, it would be prudent to undertake a new waste composition survey, since the modelling shows wide differences in the costs and environmental performances between the 26% or the 19% composition assumptions. The 26% composition is based on a survey completed in East Lindsey now more than 5 years ago. Any new survey should cover a number of districts in order to give representative data for the county.

8 Conclusions

This Environmental Report has been produced as part of an SEA to assess the impacts of Lincolnshire's Joint Municipal Waste Strategy.

A central element of the SEA has been the modelling of nine integrated scenarios for managing Lincolnshire's waste arisings: these employed different treatment technologies for organic and residual waste. While broadly representative of the residual waste treatment technologies available, these scenarios should not be taken as being definitive. It should be emphasised that the purpose of the SEA is not to promote one 'best scenario'; instead the assessment methodology enables the benefits and issues in each modelled case to be identified. In identifying its preferred waste management system, the Lincolnshire Waste Partnership will need to consider these different aspects and the inevitable 'trade-offs' that result.

The scoring methodology applied in this Environmental Report provides a comparison between scenarios, but it does not enable evaluation of the overall environmental and socio-economic significance, nor does it determine their acceptability against defined criteria. Such an assessment of acceptability may reveal that several, or all, of the proposed scenarios are acceptable, or conversely, that even the highest scoring scenario is unacceptable.

The following conclusions result from the Environmental Report **after the weighting** of the criteria.

- Scenario 7 and 8 (EfW with and without CHP) performs well, scenario 8 is the preferred option once the weighing is applied, and scenario 7 is ranked 3rd. They score highly in the environmental aspects and also highly against the waste hierarchy and policy criteria. This is because the technology provides energy recovery and produces minimal rejects requiring landfilling. The combination of these factors allows it to score well in the environmental criteria; particularly against a number of the WRATE assessed criteria. These options also score well in economic terms, being the second and third least expensive options after the ATT scenario. On the other hand, the thermal treatment scenarios score lower in terms of water usage due to flue gas cleaning and the steam raising plant, and in terms of the amount of hazardous waste produced as fly ash.

- The other thermal treatment, scenario 9 ATT, scores the second highest once weightings have been applied, and is the least expensive option. However, the ATT process has a very limited track record in processing municipal solid waste and consequently the costs are difficult to forecast with any certainty accurately predict. Additionally, as there are currently no large-scale commercial plants in operation in the UK this will impact substantially on the bankability of the technology. It should be noted that the costs provided within this SEA are only indicative and for comparison reasons. Only through a procurement exercise can the actual costs be determined. In conclusion, although the ATT scenario performs well it may not be acceptable to the County Council due to its lower maturity of technology and deliverability issues.

- Out of the MBT scenarios, scenarios 4 and 5 score better than the rest. Scenario 5 (ranked 4th), MBT with anaerobic digestion and aerobic stabilisation, scores the highest of all the MBT process because of the high recycling targets achieved. It also has the lowest cost of all the MBT scenarios.

- Scenario 4, MBT with RDF to 3rd party (ranked 5th), scores well in terms of the waste hierarchy and policy requirements. Nevertheless, it has the highest transport impact due to the transport of residues to landfill and the transport of RDF to a more distant facility.

- The MBT scenarios score poorly in terms of transport impacts due to large quantities of material needing further onward transport once processed. The MBT processing operation also has the highest potential to generate noise, odour and dust, and the higher amount of compost like output that is produced could result in water quality impacts due to leachate from the compost product once landfilled. The scenarios additionally score well in the prudent use of water criterion, since there is no thermal combustion stage.

- The Base Case landfill scenario, is ranked 6th and scores well in terms of minimising the potential for nuisance from noise, odour and dust, because no processing plant is required (processing waste will generate noise, odour and dust). Furthermore, as this scenario does not require treatment of the residual waste, criteria such as land take and water use also receive a high score. However, the scenario performs very poorly in all the waste hierarchy and policy requirements due to the reliance on landfill as a disposal route. The Base Case scenario scores poorly in terms of minimising greenhouse gas emissions due to both landfilling of biodegradable waste (which will generate methane) and a lower level of energy recovery than most of the other scenarios, which also means that there is a higher level of resource depletion (as the energy produced can be off-set against use of fossil fuels). The scenario also scores poorly in economic aspects in job creation terms.

- The scenarios with RDF combustion onsite (3 & 6), achieved the lowest ranked due mainly to a poor performance in the odour, dust, litter and vermin criteria. They also have high costs due to the additional costs of an on-site RDF combustion facility (scenario 3 is the most expensive scenario by a considerable margin). On the other hand, they score well in other areas such as energy recovery and job creation.

- The MBT with RDF to 3rd party scenario 4, scores better in terms of costs than other MBT based scenarios, however, in practical terms this is dependant upon a suitable long-term market for the RDF product being identified. The lack of a market would mean that the RDF product would need to be landfilled resulting in receiving lower scores for a number of criteria (and the additional landfill costs could result in the scenarios having a higher total cost than other scenarios).

Appendices

Appendix A: Measured Criteria

Appendix B: Not Measured Criteria

Appendix C: Scenario specific matrix

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Appendices

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APPENDIX A: Measured criteria

This appendix presents the results of the assessment of the 21 measured criteria for each of the nine scenarios; these cover environmental objectives, economic objectives, social objectives, deliverability, and waste policy. The landscape and townscape criteria, three criteria covering deliverability, one of the two factors covering economic factors, and one criteria for social objectives are non-measurable criteria, and these are discussed in Appendix B. The assessments were conducted using the Environment Agency's WRATE software, AEA's wasteflow model, or professional judgement (based on comparative data for waste treatment plants).

A1. Minimise impact on population and human health

The assessment criteria cover the following:

- Minimising nuisance from noise, odour, dust, litter and vermin generation
- Minimising local transport impacts
- Minimising the health impact of waste treatment facilities.

A1.1 Minimise nuisance

Nuisance such as a higher noise level, odour, dust and generation of litter and vermin may increase in the proximity of waste treatment facilities and waste disposal sites. The impact of noise, dust etc may have the potential to cause harm to human health and the environment if acceptable levels are exceeded. Therefore the level of potential nuisance from waste treatment and disposal sites, and its impact on nearby residents, is an important factor to consider, particularly when considering a planning application for a waste management facility.

As planning issues are normally specific to individual facilities, the assessment was conducted by allocating performance scores to each type of facility used (these scores have been generated through consultation with waste management professionals and planners to derive a professional judgement of the potential of a particular facility type to cause a problem). The performance scores for each facility were then totalled to determine the overall performance score for each scenario. The main differences between the scores for each scenario are due to the impacts from the residual management (landfill, MBT, EfW or ATT) facility and treatment of source segregated organic waste through windrow, IVC and AD.

The scores are based on the amount of waste that is handled in these facilities, and thus reflect the impacts from dealing with this waste.

A1.2 Minimise noise level

The noise issues for all of the scenarios are shown in Table A.1. A landfill site will generate noise due to the mechanical equipment required to compact the waste, but this will be less than a processing facility. Processing plants which include pre-treatment activities such mechanical separation, e.g. MBT generally have a higher potential for noise problems than thermal treatment facilities, e.g. EfW and ATT.

Table A.1: Noise and vibration potential for each scenario

Scenario	Noise potential	Normalised score
Sc 1- Base Case	32.00	1.00
Sc 2- MBT-Aerobic	34.34	0.47
Sc 3- MBT-RDF on site	36.13	0.07
Sc 4- MBT-RDF to 3rd party	34.13	0.52
Sc 5- MBT-AD + Aerobic	34.24	0.50
Sc 6- MBT-AD + Aerobic with RDF onsite	36.44	0.00
Sc 7 – EfW	33.50	0.66
Sc 8 - EfW-CHP	33.50	0.66
Sc 9- ATT Gasification	33.50	0.66

Scenario 1 (Base Case) performs best due to the lack of residual waste processing facilities. MBT technology and recycling facilities such as a MRF or Aerobic treatment have the highest potential for noise problems due to the mechanical separation and processing involved. The noise level of landfilling has been taken into account in this assessment whereas the combustion of RDF at 3rd parties has not been included. Scenario 2 shows a higher potential for noise level due to additional rejects or compost like output (CLO) needing to be landfilled.

A1.3 Minimise extent of odour problems

Odour is produced by all waste management activities, and Table A.2 shows that all nine scenarios have similar odour and dust issues.

Table A.2: Odour potential for each scenario

Scenario	Odour potential	Normalised score
Sc 1- Base Case	48.15	0.91
Sc 2- MBT-Aerobic	49.96	0.36
Sc 3- MBT-RDF on site	50.58	0.17
Sc 4- MBT-RDF to 3rd party	49.58	0.47
Sc 5- MBT-AD + Aerobic	49.78	0.41
Sc 6- MBT-AD + Aerobic with RDF onsite	51.13	0.00
Sc 7 – EfW	47.86	1.00
Sc 8 - EfW-CHP	47.86	1.00
Sc 9- ATT Gasification	47.84	1.00

The MBT with RDF onsite technologies have the highest potential to create odour due to having a MBT plant and a combustion plant on the same site. Consequently these scenarios receive the lowest scores for odour. Odour is also generated during landfilling activities and at the EfW and ATT facilities, but these are less than those created by the MBT processes. Scenario 1 is likely to create higher levels of odour than the thermal treatment options (EfW & ATT) due to the large quantities of unprocessed residual waste landfilled.

A1.4 Minimise extent of dust problems

Dust is produced by all waste management activities, and Table A.3 shows that all nine scenarios have similar dust potential.

Table A.3: Dust potential for each scenario

Scenario	Dust potential	Normalised score
Sc 1- Base Case	27.10	0.95
Sc 2- MBT-Aerobic	28.04	0.53
Sc 3- MBT-RDF on site	28.71	0.22
Sc 4- MBT-RDF to 3rd party	27.71	0.68
Sc 5- MBT-AD + Aerobic	27.88	0.60
Sc 6- MBT-AD + Aerobic with RDF onsite	29.20	0.00
Sc 7 – EfW	27.01	0.99
Sc 8 - EfW-CHP	27.01	0.99
Sc 9- ATT Gasification	26.99	1.00

The MBT with RDF onsite technologies have, again, the highest potential to create dust due to both the mechanical sorting process and the RDF burning process. Consequently these scenarios receive the lowest scores for dust potential. Dust is also generated during landfilling activities and at the EfW facility, but this is less than that created by the MBT processes. Scenario 1 is likely to create higher levels of dust than the thermal treatment options (EfW & ATT) due to the large quantities of unprocessed residual waste landfilled.

A1.5 Minimise extent of litter and vermin generation

The potential for all scenarios to generate litter and attract vermin is shown in Table A.4

Table A.4: Litter and vermin generation for each scenario

Scenario	Litter and vermin potential	Normalised score
Sc 1- Base Case	45.30	0.96
Sc 2- MBT-Aerobic	46.74	0.43
Sc 3- MBT-RDF on site	47.41	0.18
Sc 4- MBT-RDF to 3rd party	46.41	0.55
Sc 5- MBT-AD + Aerobic	46.58	0.49
Sc 6- MBT-AD + Aerobic with RDF onsite	47.90	0.00
Sc 7 – EfW	45.21	1.00
Sc 8 - EfW-CHP	45.21	1.00
Sc 9- ATT Gasification	45.19	1.00

MBT scenarios with RDF onsite have the most potential to generate litter and attract vermin due to the nature of its operation even though the mechanical process is enclosed and controlled.

When comparing the overall scenario, the rest of the MBT technologies show a higher potential for litter and vermin generation compared to the remaining scenarios although

Scenario 5 (MBT with RDF to 3rd party) scores slightly better than others because the RDF is taken to a 3rd party facility and less waste is landfilled. Overall, thermal treatment scenarios (EfW & ATT) show lower potential and therefore score highest because they landfill low quantities of waste and the technologies cause less litter and vermin problems than the MBT technologies.

A1.6 Minimising local transport impacts

The impacts on transport caused by waste management activities arise mainly from two sources - congestion and emissions. The congestion, disruption and noise caused by waste vehicles on residential streets are important factors and may cause traffic hold-ups, and thereby cause additional pollution. The impact of transport may be reduced by dealing with waste locally wherever practicable and by the efficient organisation of collection rounds and any onward journey to treatment facilities, re-processors and markets. In addition, depending on the location, scope may exist to utilise integrated transport.

Dealing with waste locally will decrease the distance travelled. Consequently the assessment was based on the distance of travelling required within the Lincolnshire boundary for collection of material and removal of products from the treatment processes. These are shown in Table A.5.

Table A.5: Distance travelled

Scenario	Number of transport movements	Normalised score
Sc 1- Base Case	2,949,281	1.00
Sc 2- MBT-Aerobic	3,600,175	0.00
Sc 3- MBT-RDF on site	3,459,179	0.22
Sc 4- MBT-RDF to 3rd party	3,600,175	0.00
Sc 5- MBT-AD + Aerobic	3,550,103	0.08
Sc 6- MBT-AD + Aerobic with RDF onsite	3,517,161	0.13
Sc 7 – EfW	3,449,953	0.23
Sc 8 - EfW-CHP	3,449,953	0.23
Sc 9- ATT Gasification	3,449,953	0.23

Scenarios 2 and 4 have the highest transport impact. In scenario 2 there is still a high percentage of rejects going from the facility to landfill and scenario 4 has increased transport due to the RDF going to a 3rd party facility. Thermal treatment scenarios have a lower transport impact than MBT.

The Base Case (Scenario 1) has the lowest movements as the residual waste is going straight to the landfill sites.

A1.7 Minimising the health impact of waste treatment facilities.

Where impacts on human health and the environment are concerned there is no definitive solution to managing waste; all treatment technologies generate various types and levels of emissions to air, land and water.

Many studies have been conducted into the health impacts of waste management facilities. For example:

- Landfill sites have been investigated as the possible cause of birth defects, cancers and respiratory illnesses including asthma;
- Incinerators have been investigated as to possible increases in cancer, birth defects and respiratory illnesses including asthma. Other studies have particularly concentrated on emissions of dioxins; and
- Composting and Materials Recycling Facilities (MRFs) have been investigated for possible exposures to micro-organisms and odours, and lung diseases like bronchitis.

In 2004, Defra published a review[1] of the assessment of available research, which attempted to quantify, where possible, the potential health effects of waste management. Although the limited data in some areas, particularly for composting facilities, means that caution is needed in using the findings from this study, the report identifies that:

- There is some evidence that the number of deaths brought forward per tonne of waste managed is higher for incineration facilities, but the margin of uncertainty means that it is not possible to determine if one option for managing waste is better than another in terms of deaths brought forward due to emissions to air;
- There is an indication that incineration may have a greater effect on hospital admissions due to respiratory conditions than landfills; and
- The available data does not indicate that any option for managing waste is better or worse than other options in terms of cancer cases caused by emissions to air.

However, it should be noted that emission levels from incinerators have significantly reduced in the last 10 years, and thus the potential health impacts from newer facilities, due to air emissions, may well be lower than those used in the 2004 study.

Some of the emissions that can have an impact on human health are:

- Benzene – this can cause cancer, but waste management accounts for less than 0.1% of UK emissions; the main source is transport which accounts for about 50% of UK emissions[1].
- Dioxins and furans – these are regarded as a probable cause of cancer. EfW facilities are estimated to account for less than 1% of total UK dioxin emissions; the main sources are fireworks (about 14% of total UK emissions, accidental vehicle fires (about 16% of total UK emissions), the iron and steel industry, and bonfires and barbeques[1].

Landfill is estimated to account for almost all of the cadmium emissions from waste management activities. The iron and steel industry is the main source of emissions of cadmium, and is also the main source for emissions of mercury, arsenic and lead.

The Defra report estimated that total emissions to air from managing waste are likely to result in one death brought forward and five hospital admissions every year. For comparison, traffic accidents result in over 3,000 deaths and over 300,000 hospital admissions every year, and total hospital admissions due to all sources of air pollution are

[1] Review of Environmental and Health Effects of Waste Management. Defra, May 2004

estimated to be about 14,000 per year. The number of cancers caused per year from waste management activities was estimated to be less than 0.001% of those caused by passive smoking.

The Environment Agency's WRATE software was used to determine the human health impacts of each scenario. This uses an assessment based on the fact that some substances can accumulate in living organisms (e.g. through the lungs, skin from food etc), increasing the risk that toxic concentrations will be reached; some of the best known of these substances are mercury, Dichlorodiphenyltrichloroethane (DDT) and dioxins. The WRATE index is expressed as kg of 1,4-dichlorobenzene through equivalence factors for the relative toxicity of the emitted compounds, and the findings from the WRATE assessment of each scenario are shown in

Figure A.1and Table A.6. A negative index score assumes that the scenario has a positive lifecycle impact, whereas a positive score indicates a detrimental impact.

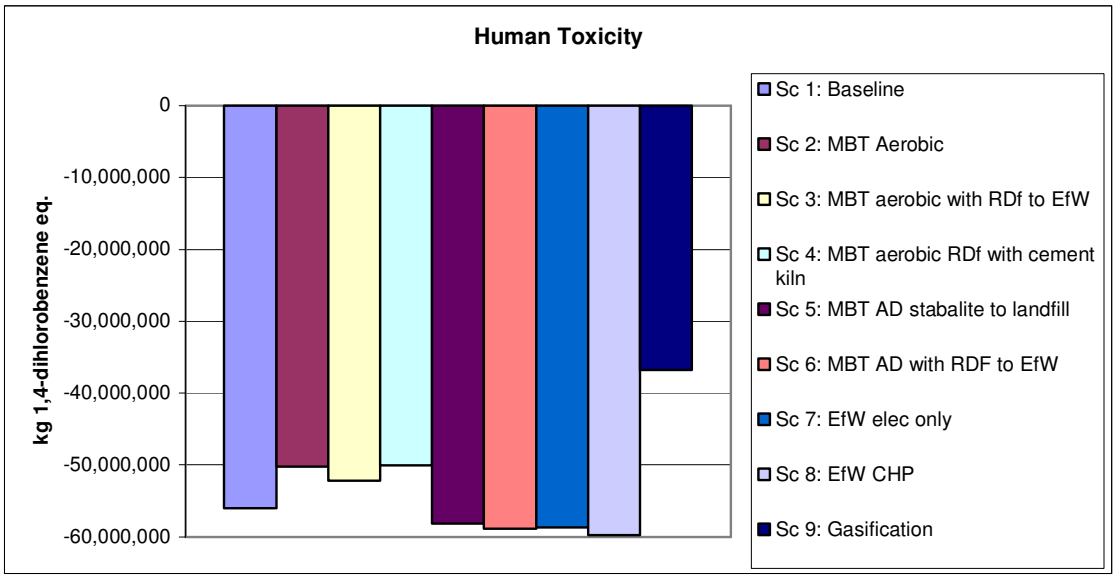


Figure A.1: Human toxicity potential

All the scenarios show a benefit in the effect on human toxicity as the large amounts of energy generated can be offset against the use of direct fossil fuels and the associated toxic emissions from power plants.

One of the key differences affecting the human toxicity impact is the amount of biodegradable waste landfilled. Biodegradable waste landfilled will have a detrimental impact on human toxicity and therefore the scenarios where more biodegradable waste is sent to landfill have a lower environmental benefit i.e. scenarios 1, 2, & 5.

Scenarios 5, 6, 7,and 8 have the greatest benefit to human toxicity due to the amount of waste that is combusted resulting in an energy output from the facilities. The CHP EfW has the highest energy output, and subsequently the greatest benefit.

Table A.6: Potential health impacts from waste facilities (kg 1,4 dichlorobenzene eq.)

Scenario	Human toxicity (WRATE)	Normalised score
Sc 1- Base Case	-56,022,438	0.84
Sc 2- MBT-Aerobic	-50,258,709	0.59
Sc 3- MBT-RDF on site	-52,214,751	0.67
Sc 4- MBT-RDF to 3rd party	-50,096,094	0.58
Sc 5- MBT-AD + Aerobic	-58,114,399	0.93
Sc 6- MBT-AD + Aerobic with RDF onsite	-58,857,108	0.96
Sc 7 – EfW	-58,640,517	0.95
Sc 8 - EfW-CHP	-59,733,594	1.00
Sc 9- ATT Gasification	-36,791,988	0.00

A2. Minimise impact on air, water and land

The assessment criteria cover the following:

- Minimising harmful emissions from waste facilities to water
- Minimising the impact of waste treatment on soil quality
- Minimising the impact of waste treatment and transport on air quality.

A2.1 Minimising harmful emissions from waste facilities to water

The release of compounds containing the nutritive elements nitrogen, phosphorus or organic matter, can potentially lead to eutrophication of surface watercourses. The accumulation of nutritive elements in the water leads to the growth of particular types of algae, resulting in a subsequent depletion of oxygen in the water, and a change in species living in the body of water (e.g. the disappearance of fish such as trout). Leachate from landfills and treatment facilities are the main source of such compounds in waste management.

The Environment Agency's WRATE software was used to determine the impact of the waste facilities on water quality through an assessment of their eutrophication potential. The WRATE index is expressed in terms of phosphate content (kg PO_4 equivalent), and the findings from the WRATE assessment of each scenario are shown in

Figure **A.2** and Table A. 7. A negative index score assumes that the scenario has a positive lifecycle impact, whereas a positive score indicates a detrimental impact.

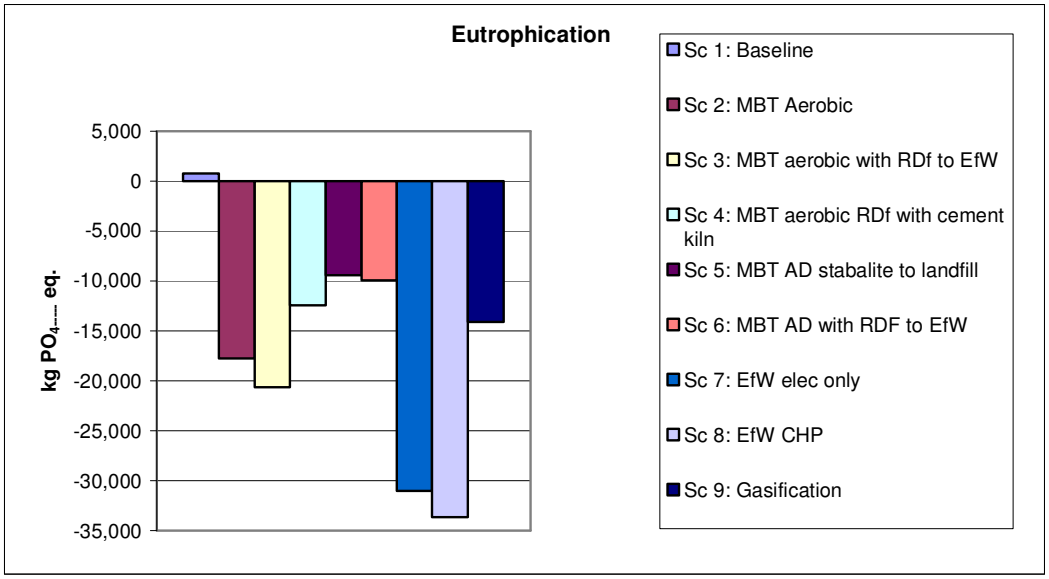


Figure A.2 Eutrophication Impacts

With the exception of Scenario 1, all the scenarios show an overall benefit to eutrophication. This is due to the combustion of the organics in these scenarios and the avoidance of these going to landfill.

Scenario 1 results in an overall contribution to eutrophication (i.e. detriment to the environment). One of the key factors in this is the quantity of waste sent to landfill and the treated residues (eg CLO) used on land or sent to landfill, which can cause eutrophication through leaching. .

Table A. 7: Potential harmful emissions from waste facilities to water (kg PO_4 equivalent)

Scenario	Eutrophication potential	Normalised score
Sc 1- Base Case	742	0.00
Sc 2- MBT-Aerobic	-17,750	0.54
Sc 3- MBT-RDF on site	-20,657	0.62
Sc 4- MBT-RDF to 3rd party	-12,449	0.38
Sc 5- MBT-AD + Aerobic	-9,454	0.30
Sc 6- MBT-AD + Aerobic with RDF onsite	-9,921	0.31
Sc 7 – EfW	-30,983	0.92
Sc 8 - EfW-CHP	-33,613	1.00
Sc 9- ATT Gasification	-14,081	0.43

A2.2 Minimising the impact of waste treatment on soil quality

This is assessed by one criterion the amount of hazardous waste produced. Hazardous waste may be collected at two points within the municipal waste stream:

- Hazardous waste items arising in household waste; and
- Hazardous items arising in collected trade waste.

Education campaigns aim to encourage separation of hazardous items and thus reduce the hazardous materials that are landfilled. As the hazardous materials arise prior to the treatment process, the tonnage of these hazardous waste streams are assumed to be the same in all scenarios, and thus they are not further considered in this assessment. An important consideration for this SEA is that some waste treatment processes can also concentrate and potentially generate hazardous waste. It is unlikely that any hazardous waste stream would be produced by MBT, composting, aerobic or anaerobic digestion processes other than what already exists in the waste stream. However, waste combustion using an EfW or ATT facility will produce fly-ash, and this is classified as a hazardous waste. Consequently, the amount of fly-ash produced reflects the difference between the residual treatment technologies and quantity of waste processed as shown in Table A.8.

Table A.8: Potential for hazardous waste generation

Scenario	Amount of hazardous waste arising (tonnes)	Normalised score
Sc 1- Base Case	0	1.00
Sc 2- MBT-Aerobic	0	1.00
Sc 3- MBT-RDF on site	2,820	0.29
Sc 4- MBT-RDF to 3rd party	0	1.00
Sc 5- MBT-AD + Aerobic	0	1.00
Sc 6- MBT-AD + Aerobic with RDF onsite	659	0.83
Sc 7 – EfW	3,953	0.00
Sc 8 - EfW-CHP	3,953	0.00
Sc 9- ATT Gasification	3,953	0.00

Scenarios 7, 8 and 9 all generate the same level of hazardous waste from utilising either an EfW or ATT technology.

A2.3 Minimising the impact of waste treatment and transport on air quality.

Emission of acid gases into the air can have a number of environmental impacts at a local to regional level, including effects on human health, sensitive ecosystems, soiling and deterioration of building facades, forest decline and acidification of lakes. Air acidification potential is largely dependant on the emissions of SO_x and HCl. The main source of SO_x is from combustion of sulphur rich fossil fuels and one source of HCl is from the combustion of wastes. Waste treatment technologies that generate energy (such as EfW or plants which produce a fuel product such as MBT) enable a reduction in energy generated from fossil fuel sources to be achieved and this reduces emissions of SO_x. HCl emissions have a relatively minor impact in this balance. Energy saving through recycling also has a beneficial effect in reducing SO_x emissions.

Nitrogen dioxide also contributes to acid rain and excessive levels can cause damage to some environments. Management of MSW contributes about 1% of total emissions; the main source is from EfW combustion, which is tightly controlled (other emissions from landfill and composting are much smaller)[2]. The main UK-sources of nitrogen emissions are road traffic (37%), and electricity generation (27%)[3].

The Environment Agency's WRATE software was used to determine the impact of each scenario (in terms of both waste treatment processes and transport distances) on acid gas emissions as these reflect their impact on air quality. The WRATE index is expressed in terms of sulphur dioxide (SO_2) emissions, as this is the main acidic gas. The findings from the WRATE assessment of each scenario are shown in Figure A.3 and Table A.9. A negative index score assumes that the scenario has a positive lifecycle impact, whereas a positive score indicates a detrimental impact.

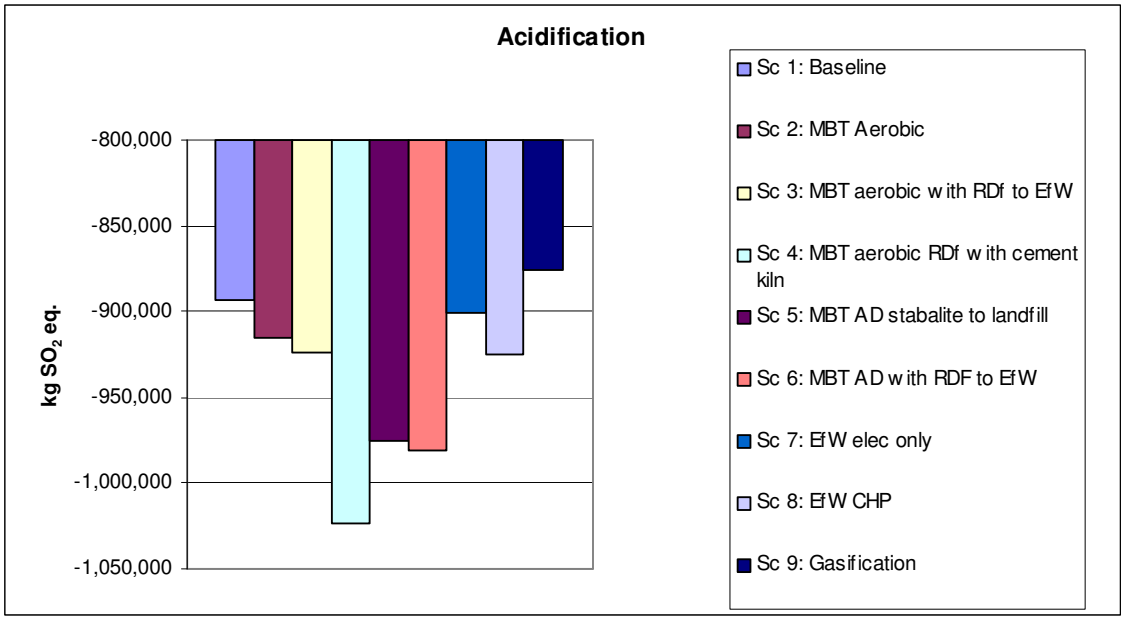


Figure A.3: Acidification Potential (kg SO_2 eq.)

The scenarios all show a benefit on acidification releases.

The gasifier in scenario 9 has lower NOx emissions than an incinerator and NOx is a contributor to atmospheric acidification. However the lower energy production from the gasifier results in a similar effect on acidification as the other scenarios.

The RDF combustion in scenarios 4 and 6 has the greatest benefit as although some acid gases are emitted, not as much waste is combusted as in some other scenarios and therefore the acid emissions are lower. It also has the benefit gained by the energy production, which can be offset against the use of fossil fuels.

[2] Review of Environmental and Health Effects of Waste Management. Defra, May 2004
[3] UK Emissions of Air Pollutants 1970 to 2004, UK Emissions Inventory Team, 2006.

Table A.9: Potential harmful gas emissions from waste facilities and transport (kg SO_2 equivalent)

Scenario	Air quality impact	Normalised score
Sc 1- Base Case	-893,140	0.12
Sc 2- MBT-Aerobic	-914,651	0.26
Sc 3- MBT-RDF on site	-923,899	0.33
Sc 4- MBT-RDF to 3rd party	-1,024,053	1.00
Sc 5- MBT-AD + Aerobic	-975,382	0.67
Sc 6- MBT-AD + Aerobic with RDF onsite	-981,110	0.71
Sc 7 – EfW	-900,547	0.17
Sc 8 - EfW-CHP	-925,255	0.34
Sc 9- ATT Gasification	-875,336	0.00

A3. Minimising global warming potential

This is assessed through two criteria:

- Reduction in greenhouse gases.
- Energy production by waste treatment.

A3.1 Reduction in Greenhouse gases

There is now an international consensus that emissions of greenhouse gases are responsible for ‘global warming’ or 'global climate change’. Global climate change could lead to substantial changes in global temperatures, weather patterns and sea levels, with subsequent effects in a diverse number of areas, e.g. agriculture, water resources, human health, natural ecosystems.

The main sources of greenhouse gases from a waste management perspective are methane (CH_4) emissions from landfill sites and carbon dioxide (CO_2) from the combustion of fossil fuels. Fossil fuels including; vehicle fuels (e.g. diesel in the operation of refuse vehicles), power station fuel sources to produce electricity used at waste treatment facilities and the combustion of fossil fuel originated material, such as plastics, in EfW plants. CO_2 emissions from the combustion or degradation of ‘organic’ material such as putrescibles and paper are not considered to contribute to climate change, as they are carbon neutral – they release carbon that was originally recently sequestered from the air.

Waste management scenarios that produce energy (e.g. EfW plant and/or beneficial use of landfill gas) will assist in reducing greenhouse gas emissions by decreasing the amount of fossil fuels required to produce the equivalent quantity of electricity – the assumption is made that the displaced power generation capacity is from coal fired plants. Recycling has a similar effect in that it often saves energy in the production of raw materials.

The findings from the WRATE assessment of each scenario are shown in Figure A.4 and Table A10. A negative index score assumes that the scenario has a positive lifecycle impact, whereas a positive score indicates a detrimental impact.

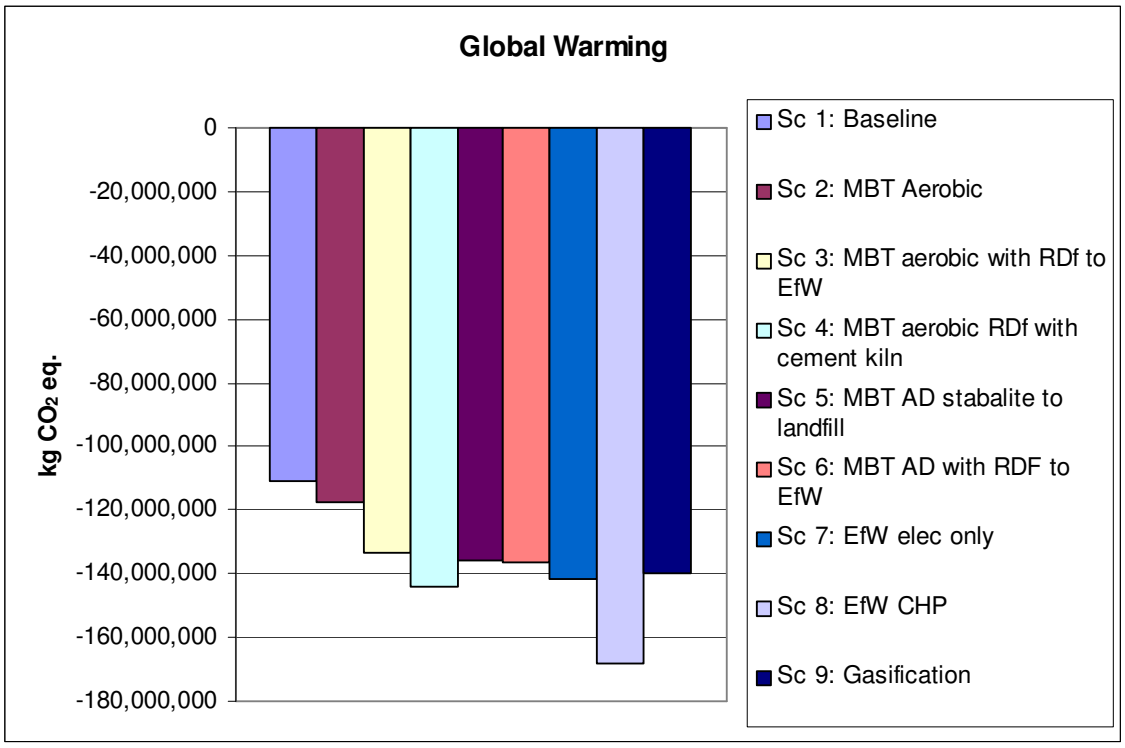


Figure A. 4: Global warming potential (kg CO_2 eq.)

All the scenarios show a low impact on global warming as they include high levels of recycling and also produce energy, which can be offset against the direct use of fossil fuels.

The results show a similar pattern as for the resource depletion analysis as they are predominantly based on the energy output of the processes. The EfW CHP scenario (Scenario 8) has the greatest benefit as it has the highest energy output. Although MBT with third party RDF has a high-energy output the greenhouse gas emissions from this are also high and therefore it does not perform as well as the EfW CHP.

The landfill baseline scenario performs worst as landfilling of waste releases large amounts of CO_2 and other greenhouse gases. The scenarios where more waste is diverted from landfill have a lower impact on global warming.

The gasifier in scenario 9 performs well because although less energy is produced in this scenario, the NOx emissions from the gasifier are much lower than for the EfW and NOx emissions and emissions of N_2O, whilst small, have a large impact (approximately 310 times CO_2 equivalents).

Table A10: Potential greenhouse gas emissions from waste facilities and transport (kg CO_2 equivalent)

Scenario	Impact on climate change	Normalised score
Sc 1- Base Case	-110,840,326	0.00
Sc 2- MBT-Aerobic	-117,495,536	0.12
Sc 3- MBT-RDF on site	-133,494,348	0.39
Sc 4- MBT-RDF to 3rd party	-144,017,183	0.58
Sc 5- MBT-AD + Aerobic	-135,539,794	0.43
Sc 6- MBT-AD + Aerobic with RDF onsite	-136,423,744	0.44
Sc 7 – EfW	-141,522,073	0.53
Sc 8 - EfW-CHP	-168,446,793	1.00
Sc 9- ATT Gasification	-139,809,958	0.50

A3.2 Energy produced

Some technologies have the advantage of reducing greenhouse gases as a result of the production of energy at the treatment plant. The typical process energy production for each treatment technology is indicated in Table A 11.

Table A 11: Typical energy production from waste treatment facilities

Technology	Energy output (kWh) [4]
AD	75
Small EfW (RDF scenarios)	992
EfW	567
EfW with CHP	2280
EfW/ATT	493

Table A 12 shows the estimated yearly process energy production for each scenario. These have been determined using the typical process energy production per tonne of material processed for each type of facility and the tonnage throughputs determined during the modelling of the scenarios.

Table A 12: Renewable energy produced

Scenario	Energy output (kWh)	Normalised score
Sc 1- Base Case	0	0.00
Sc 2- MBT-Aerobic	0	0.00
Sc 3- MBT-RDF on site	65,359	0.22
Sc 4- MBT-RDF to 3rd party	0	0.00
Sc 5- MBT-AD + Aerobic	9,883	0.03
Sc 6- MBT-AD + Aerobic with RDF onsite	60,863	0.20
Sc 7 – EfW	74,715	0.25
Sc 8 - EfW-CHP	300,440	1.00
Sc 9- ATT Gasification	64,964	0.22

[4] Data supplied by the waste management industry

The EfW with CHP has the highest amount of energy produced because of the extra amount of energy from the heat provided. The MBT with RDF scenarios do not produce as much energy as the thermal treatments due to smaller quantities of RDF combusted.

A4. Minimising the use of resources

This is assessed through three criteria:

- Prudent use of land
- Prudent use of water
- Prudent use of other resources.

A4.1 Prudent use of land

Land is a valuable resource and should be treated accordingly. The area of land required by the waste management system is estimated from the number of facilities that will be required and the amount of residual waste sent to landfill, and is shown in Table A.13. This assessment is based on the typical land requirements for generic types and sizes of facility; this data has been derived from access to tendered information (for various waste management systems) as part of our activity in the environmental consultancy sector and information openly available, such as the Juniper technology reports and the Environment Agency's Waste Technology Data Centre.

Table A.13: Estimated landtake (hectares) for each scenario

Scenario	Landtake (ha)	Normalised score
Sc 1- Base Case	16.07	1.00
Sc 2- MBT-Aerobic	19.98	0.00
Sc 3- MBT-RDF on site	19.12	0.22
Sc 4- MBT-RDF to 3rd party	19.12	0.22
Sc 5- MBT-AD + Aerobic	19.32	0.17
Sc 6- MBT-AD + Aerobic with RDF onsite	19.24	0.19
Sc 7 – EfW	18.43	0.40
Sc 8 - EfW-CHP	18.43	0.40
Sc 9- ATT Gasification	18.43	0.40

The landtake requirement for the Base Case scenario is the smallest as no land is required for a residual waste treatment plant (though it could be argued that the greater use of the existing landfill will advance the time when a replacement needs to be brought on-line). Processing facilities with mechanical separation and bio-waste processing generally require more land than thermal treatment facilities (EfW, ATT), as demonstrated by Scenarios 2, 3, 4, 5 & 6. All the thermal treatment scenarios require similar levels of landtake due to the capacities being identical, no composting requirements, and the residues sent to landfill being similar in quantity.

A4.2 Prudent use of water

The main use of water by waste treatment plants will be the requirement for process water. Water will also be used for staff hygiene activities, and for washing/cleaning activities at the plant, but this is likely to be similar for all of the treatment processes being considered, and thus the evaluation is based on process water consumption. The typical process water consumption for each treatment technology is indicated in Table A.14.

Table A.14: Typical water consumption for waste treatment

Technology	Water consumption (litres/tonne processed) [5]	Comments
Mechanical sorting	10	Dust control
IVC	5	Dust control and processing
AD	20	Dust control and processing
EfW/ATT	450	Flue gas cleaning and make-up water for steam raising plant

Table A.15 shows the estimated yearly process water consumption for each scenario. These have been determined using the typical process water consumption per tonne of material processed for each type of facility and the tonnage throughputs determined during the modelling of the scenarios.

Table A.15: Estimated total yearly water consumption (m3) for each scenario

Scenario	Water consumption (m^3)	Normalised score
Sc 1- Base Case	0	1.00
Sc 2- MBT-Aerobic	1,318	0.98
Sc 3- MBT-RDF on site	30,966	0.48
Sc 4- MBT-RDF to 3rd party	1,318	0.98
Sc 5- MBT-AD + Aerobic	2,635	0.96
Sc 6- MBT-AD + Aerobic with RDF onsite	25,761	0.57
Sc 7 – EfW	59,297	0.00
Sc 8 - EfW-CHP	59,297	0.00
Sc 9- ATT Gasification	59,297	0.00

The EfW and ATT scenarios potentially result in a much greater use of water compared with other scenarios because of the requirements of the flue gas cleaning equipment. However, it should be noted that this assumes the use of a wet gas cleaning process (other technologies for gas cleaning use far less water, but for comparison purposes we have assumed the worst case). The landfill scenario uses the smallest amount of water because it has no processing facilities, whilst the MBT scenarios require water for dust control and processing. The MBT with RDF uses more water than other MBT technologies due to its incineration process for burning the RDF.

[5] Data supplied by the waste management industry

A4.3 Prudent use of other resources

The world contains limited resources of both minerals and fossil fuels (i.e. coal, oil and gas), and the depletion of such resources is important when assessing the sustainability of any particular scenario. Some waste management scenarios recover energy (electricity) that would otherwise be generated from fossil fuel power stations, so the consumption of fossil fuels is avoided. The recycling of plastics reduces the amount of oil that is required during the manufacture of new plastic products using virgin materials. Recycling and composting of materials contributes more to conserving renewable resources when compared to energy production.

Resource efficiency and resource depletion are explicitly linked, and care is needed to ensure no double counting of issues. Resource depletion relates to the amount and type of resources displaced, but this depends also on the type and amount of materials being re-used or recycled. Therefore the prudent use of land and water are measured directly as these are not covered by the re-use and recycling/composting target.

Resource efficiency relates partly to the amount of resources displaced, but also to the energy generated and nutrients (nitrogen, phosphorus and potassium) provided through compost generation. However, these issues have already been covered by other criteria.

The Environment Agency's WRATE software was used to determine the impact of each scenario on use of other resources. The WRATE index is expressed in terms of kg of antimony, which all resources are made equivalent to through the use of factors relating to the global availability of the resource compared to consumption. The findings of the WRATE assessment of each scenario are shown in

Figure A.5 and Table A.16. A negative index score assumes that the scenario has a positive lifecycle impact, whereas a positive score indicates a detrimental impact.

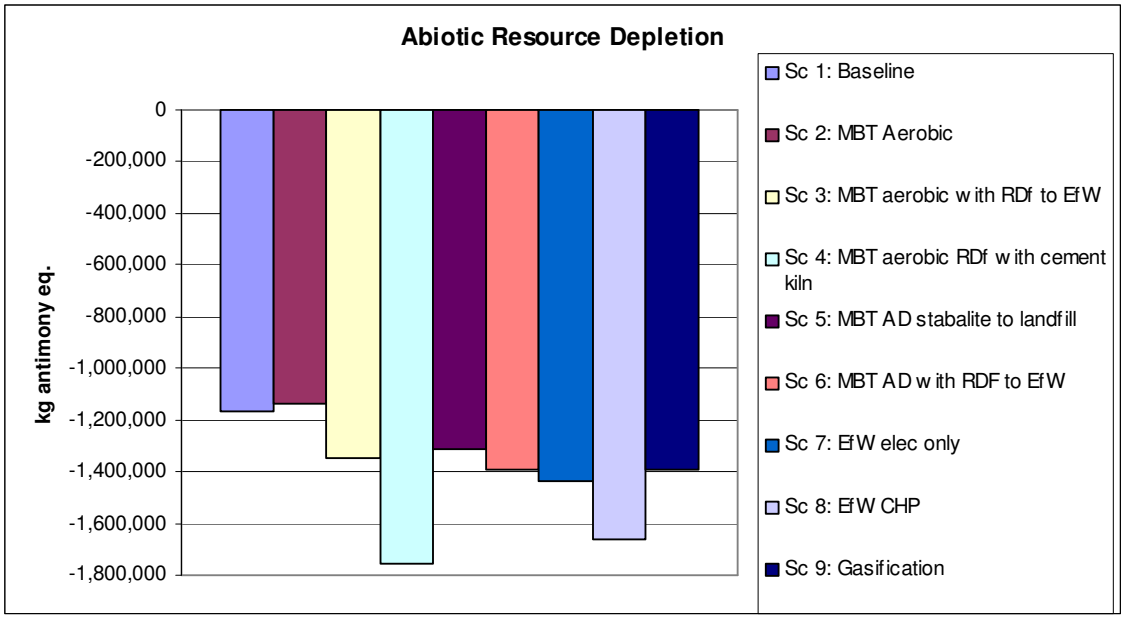


Figure A.5: Abiotic resource depletion (kg antimony equiv)

All the scenarios show a low impact on natural resources due to the recycling levels and the energy generated, which can be offset against the use of direct fossil fuels.

All the scenarios, with the exception of the MBT with third party RDF and EfW CHP, have a similar benefit over resource depletion, with the landfill baseline scenario and Aerobic MBT having the lowest benefit as very little energy is produced.

The main difference between scenarios 3 and 6 is the treatment of the green waste. In scenario 3 treatment is aerobic and in scenario 6 it is anaerobic. The anaerobic process has a more beneficial impact on resource depletion, as it generates electricity, via the biogas production.

The scenarios with some form of combustion generally perform slightly better than those without due to the higher energy recovery from these processes and therefore their greater potential to offset against direct use of fossil fuels.

MBT with third party RDF and EfW CHP produce significantly more energy than the other treatment scenarios and therefore this can be offset against the direct use of fossil fuels and helps to retain natural resources.

Table A.16: Resources depletion (kg antimony equivalent)

Scenario	Resource depletion	Normalised score
Sc 1- Base Case	-1,168,209	0.05
Sc 2- MBT-Aerobic	-1,138,310	0.00
Sc 3- MBT-RDF on site	-1,351,393	0.35
Sc 4- MBT-RDF to 3rd party	-1,755,681	1.00
Sc 5- MBT-AD + Aerobic	-1,313,326	0.28
Sc 6- MBT-AD + Aerobic with RDF onsite	-1,389,632	0.41
Sc 7 – EfW	-1,433,872	0.48
Sc 8 - EfW-CHP	-1,662,609	0.85
Sc 9- ATT Gasification	-1,393,848	0.41

A5. Economic Objectives

The two main economic objectives measured are:

- The overall cost of waste management activities
- Maximising employment opportunities

A5.1 Cost of waste management activities

The methodology for determining the overall cost for each scenario for the years 2010 to 2035 (based on an expected lifetime of a waste treatment plant of 25 years) were described in Section 3.2 of the report, and Table A 17 shows the estimated costs for each scenario over this period.

Table A 17: Total cost (£ million) for each scenario for the period 2010 to 2035

Scenario	Total cost (£ million)	Normalised score
Sc 1- Base Case	1,258	0.74
Sc 2- MBT-Aerobic	1,339	0.53
Sc 3- MBT-RDF on site	1,550	0.00
Sc 4- MBT-RDF to 3rd party	1,477	0.18
Sc 5- MBT-AD + Aerobic	1,312	0.60
Sc 6- MBT-AD + Aerobic with RDF onsite	1,848	0.17
Sc 7 – EfW	1,180	0.93
Sc 8 - EfW-CHP	1,180	0.93
Sc 9- ATT Gasification	1,154	1.00

The collection costs are the same for all Scenarios. However, the major influence on the total costs is the type of residual waste treatment and the impact on diverting material from landfill.

The ATT scenario is the least expensive option. This is owing to the low operating cost of the ATT facility because of the additional benefits of ROCs income from the energy produced, and due to gasifiers being more economic at small scale that EfW. ATT also has a higher level of diversion of biodegradable waste (compared to the MBT scenarios), which results in lower landfill costs and higher income from the sale of LATS allowances until 2019/20.

The EfW scenarios are the second least expensive options due to a lower gate fee compared to the MBT technologies and high levels of diversion of biodegradable waste, which results in lower landfill costs and higher income from the sale of LATS allowances.

Scenario 3 (MBT with RDF onsite) has the highest cost due to a relatively high MBT gate fee, a high on site combustion cost, and a significant amount of material that requires landfilling after processing that incurs both landfill disposal and tax costs. In addition, scenario 4 (MBT with RDF sent to 3rd party) has a high cost due to a relatively high gate fee which results from the high proportion of RDF material that is sent to a third party for combustion.

The Base Case scenario is the 3rd least expensive option, cheaper than all the MBT scenarios due to the low landfill gate fees compared to the high MBT gate fees, and the need for all MBT scenarios to purchase landfill allowances after 2024.

A5.2 Maximising employment opportunities

The overall number of jobs created will depend on factors such as the amount of material collected for recycling and the processes used to treat the residual waste. Table A.18 shows the estimated number of jobs (total of jobs for waste collection, transfer and treatment) for each scenario. The number of estimated jobs for transfer and treatment was determined using data obtained from the waste management industry. The employment opportunities created at reprocessors and at the markets for the treatment products have not been considered in this criterion.

Table A.18: Estimated number of jobs in waste collection and treatment

Scenario	Number of jobs (estimated)	Normalised score
Sc 1- Base Case	96	0.00
Sc 2- MBT-Aerobic	134	0.90
Sc 3- MBT-RDF on site	134	0.90
Sc 4- MBT-RDF to 3rd party	115	0.45
Sc 5- MBT-AD + Aerobic	121	0.60
Sc 6- MBT-AD + Aerobic with RDF onsite	135	0.93
Sc 7 – EfW	138	1.00
Sc 8 - EfW-CHP	138	1.00
Sc 9- ATT Gasification	138	1.00

Thermal treatment scenarios have the highest staff requirements. The MBT with RDF scenarios all have high staff levels due to the additional residual treatment technology employed. The MBT scenarios have, in general, staffing levels that are slightly lower than the thermal technologies. The estimated number of jobs in scenario 4 does not include employment at the third party facility for RDF combustion as RDF is used as a fuel replacement and does not require a purpose built facility.

The landfill scenario results in the smallest number of jobs, as there is no requirement for an additional facility.

A6. Social objectives

There is one main social objective, which is maximising public involvement in achieving waste minimisation and recycling targets.

The role of the public in the success of any waste management system should not be underestimated and recycling schemes in particular will only be successful if the public is well informed and motivated to participate. There are also wider waste minimisation and social responsibility benefits by engaging the public in greater awareness of their role in waste generation and management. Thus the extent that the waste management system (as opposed to the effects of any additional promotional activities) helps to engage the public and allows them to get involved is considered a benefit. The potential for public involvement is calculated as the sum of households on dry recyclable and organic kerbside collection across the county.

The scenarios assessed within this report all have identical numbers of households on the kerbside collections. Therefore all the scenarios are given a normalised score of 0.

Table A.19: Public involvement

Scenario	Household involvement	Normalised score
Sc 1- Base Case	338,345	0
Sc 2- MBT-Aerobic	338,345	0
Sc 3- MBT-RDF on site	338,345	0
Sc 4- MBT-RDF to 3rd party	338,345	0
Sc 5- MBT-AD + Aerobic	338,345	0
Sc 6- MBT-AD + Aerobic with RDF onsite	338,345	0
Sc 7 – EfW	338,345	0
Sc 8 - EfW-CHP	338,345	0
Sc 9- ATT Gasification	338,345	0

A7. Deliverability of Scenarios

This is assessed through four criteria:

- Maturity of technology
- Flexibility of the waste management system to changes in future policy or waste arisings
- Public acceptance and achievement of planning permission
- The level of public participation required and effectiveness in the schemes

However, the only criterion to be formerly measured is the level of public involvement required within the scenarios. If a scenario is dependant on the public to maintain their involvement then the scenario could suffer detrimental implications if the levels of involvement drop. Within the scenarios modelled it is only the source-segregated collection of recyclates that is potentially impacted upon by public involvement. The residual treatment processes are independent of public involvement, and consequently, will not be influenced.

To assess the criterion, the participation rates and scheme efficiency required to achieve the kerbside collection levels for the dry and organic material have been summed. Table A 20 shows the combined efficiencies for each scenario

Table A 20: Public involvement required

Scenario	Public involvement required	Normalised score
Sc 1- Base Case	100%	1.00
Sc 2- MBT-Aerobic	100%	1.00
Sc 3- MBT-RDF on site	100%	1.00
Sc 4- MBT-RDF to 3rd party	100%	1.00
Sc 5- MBT-AD + Aerobic	100%	1.00
Sc 6- MBT-AD + Aerobic with RDF onsite	100%	1.00
Sc 7 – EfW	100%	1.00
Sc 8 - EfW-CHP	100%	1.00
Sc 9- ATT Gasification	100%	1.00

The scenarios assessed within this report all have identical collection scheme, therefore they all require the same participation and scheme efficiency rates. All scenarios are given a normalised score of 1.

A8. Waste policy

This is assessed by four criteria:

- Level of waste minimisation achieved
- Percentage of MSW recycled/composted
- Percentage of MSW recovered (including energy recovery)
- Percentage of biodegradable material diverted from landfill.

A8.1 Waste minimisation

Lincolnshire's waste strategy sets a target for waste minimisation, which has been included within all the scenarios assessed. Table A.21 shows the predicted waste arising in 2015.

Table A.21: Total waste arisings in 2015 (tonnes)

Scenario	Waste minimisation	Normalised score
Sc 1- Base Case	191,720	1.00
Sc 2- MBT-Aerobic	191,720	1.00
Sc 3- MBT-RDF on site	191,720	1.00
Sc 4- MBT-RDF to 3rd party	191,720	1.00
Sc 5- MBT-AD + Aerobic	191,720	1.00
Sc 6- MBT-AD + Aerobic with RDF onsite	191,720	1.00
Sc 7 – EfW	191,720	1.00
Sc 8 - EfW-CHP	191,720	1.00
Sc 9- ATT Gasification	191,720	1.00

The results indicate that all scenarios achieve a normalised score of 1 as they have the same waste minimisation targets.

A8.2 Recycling, recovery and diversion of biodegradable material from landfill

The methodology for modelling these factors was described in Section 4.2 of the report and Table A22 shows the recycling and composting levels, the recovery rates and the BMW diversion from landfill achieved in each scenario.

Table A22: Recycling, recovery and BMW diversion rates (Wt %) in 2015/16

Scenario	Recycling and composting (BVPI)	Recovery (MSW)	BMW diverted from landfill (MSW)
Sc 1- Base Case	50%	50%	56%
Sc 2- MBT-Aerobic	50%	54%	72%
Sc 3- MBT-RDF on site	50%	71%	80%
Sc 4- MBT-RDF to 3rd party	50%	71%	80%
Sc 5- MBT-AD + Aerobic	52%	61%	78%
Sc 6- MBT-AD + Aerobic with RDF onsite	52%	65%	78%
Sc 7 – EfW	50%	79%	87%
Sc 8 - EfW-CHP	50%	79%	87%
Sc 9- ATT Gasification	51%	79%	87%

The MBT scenarios with AD achieve the highest recycling rate due to the potential for recycling additional materials, particularly plastic from the residual waste stream. The two MBT technology types also recycle additional material from the residual stream compared to the thermal treatment technologies.

The thermal treatment scenarios (EfW & ATT) achieve the highest MSW recovery rate (because the rejects and compost from the MBT process are landfilled). The Base Case has a very low recovery level due to the high quantities of waste landfilled without treatment.

The BMW diversion ranking is similar to the recovery ranking, with the thermal treatment scenarios (EfW & ATT) scoring highest, followed by the MBT with RDF scenarios (scenarios 3 and 4). Once again the Base Case (Scenario 1) performs poorly with a very low BMW diversion rate achieved.

Table A.23 shows the normalised scores for the recycling, recovery and BMW diversion for each scenario.

Table A.23: Normalise scores for recycling, recovery and BMW diversion rates

Scenario	Recycling and composting (BVPI)	Recovery (MSW)	BMW diverted from landfill (MSW)
Sc 1- Base Case	0.00	0.00	0.00
Sc 2- MBT-Aerobic	0.14	0.53	0.53
Sc 3- MBT-RDF on site	0.14	0.77	0.77
Sc 4- MBT-RDF to 3rd party	0.14	0.77	0.77
Sc 5- MBT-AD + Aerobic	1.00	0.71	0.71
Sc 6- MBT-AD + Aerobic with RDF onsite	1.00	0.71	0.71
Sc 7 – EfW	0.00	1.00	1.00
Sc 8 - EfW-CHP	0.00	1.00	1.00
Sc 9- ATT Gasification	0.60	1.00	1.00

Appendix B - Unmeasured criteria

There are six criteria that have not been scored in the quantitative assessment:

- Minimising the visual and landscape impact of waste management facilities.
- Encouraging inward investment and providing community regeneration.
- Access to recycling facilities
- Assessing the deliverability and maturity of the residual treatment technology, i.e. how reliable and dependable will it be in the future, how effective is it and what is the risk of technology failure?
- Assessing the flexibility of the waste management system to changes in future policy, waste arisings etc.
- Assessing public acceptance and likelihood of achieving planning permission.

This appendix discusses the factors that are used to assess these criteria when the analysis of significant effects was conducted.

B1. Visual impact on landscape and townscape

Minimising the visual impact of waste management facilities has not been quantified because it is entirely subjective.

The issues to consider in the assessment of visual impact are:

- Number and type of facilities;
- Building profile (e.g. is it comparable to agricultural or other industrial warehouse-type buildings?);
- Similarity to surrounding environment;
- Presence and/or height of any chimney; and
- Change of landform.

An EfW or ATT facility will generally be the most intrusive because of the need for a chimney. Landfill is generally remote and of limited height, but it has an impact on the geographical area and landform. MBT, AD and composting facilities generally have a lower height profile, although they will require larger areas of land than an EfW facility.

B2. Encouraging inward investment and providing community regeneration

The implementation of the Waste Strategy will involve partnerships between a range of stakeholders, such as the local authority, waste management companies, recycling companies and the voluntary sector (community recycling groups, community enterprises and charities). The main role for these partnerships will be to support activities aimed at achieving waste minimisation & re-use targets but also recycling and composting targets.

As the targets are the same for all the scenarios except scenario 1, it is highly likely that the level and extent of partnership arrangements will be the same for these scenarios. The Base Case does not aim for a new facility and therefore there is arguably less

potential for co-operation and partnership. Some scenarios have more problems in achieving recycling targets as the residual treatment method does not actively contribute to the recycling performance, consequently more effort will be required from the partnership to achieve these targets. However, it is difficult to measure the effort required in relation to an achieved performance level, and this in turn depends on the initiatives set-up by the partnership.

B3. Access to recycling facilities

This criterion has already been measured under the opportunities for public involvement criteria. Therefore this criterion has not been assessed again to avoid duplication.

B4. Deliverability of the residual treatment option

The assessment of the deliverability of the residual treatment options covers three criteria that have not been quantified:

- The maturity of the technology
- The flexibility of the technology
- Public acceptance of the technology

B4.1 Maturity of the waste treatment technology

The maturity of a technology depends on the status of development, its commercial use in the UK and overseas but even more on its acceptability and bankability in financial terms. Hence, no score can be given, but the deliverability of the option assessed relates to its maturity.

No nationally agreed ‘definition’ exists which identifies the point at which a technology reaches a level of commercialisation sufficient to be classified as ‘proven’. The approach to acceptable risk for purposes of bankability is most often dependent on tried and tested technology, and the track record of implementation using that technology. Consequently, the assessment is based on the current status of each technology.

The following differentiation has been assumed within the scope of this SEA:

- Landfilling and EfW are well-established technologies for treating MSW and have been operating in many locations in the UK on a commercial scale for many years. Thus it seems reasonable to assume that these can be classified as “well proven” technologies for treating MSW in the UK.
- Various types of MBT processes are now established in Europe, and plants are currently operational or under construction in the UK and Europe. However, the number of plants which are currently operating in the UK is small, with the length of time that these plants have been operating being much shorter than for EfW plants. There is also concern about the availability of suitable markets and the size of the potential markets for the MBT products. Consequently, a MBT plant is classified as ‘developed but less proven commercially compared to EfW or landfill’.
- Advanced thermal treatment (ATT) processes, such as gasification, have also been used to treat some types of waste for many years, but few plants have

been commercially proven for treating MSW. However, there is a small ATT plant (currently 8,000 tonnes per annum) operating in the UK and a small number of gasifiers operating in Europe. There also appears to be a limited number of technology providers, consequently the status of technology is seen as being between 'near market' and 'proven';

It is important to emphasise that these classifications are indicative and cannot be taken as absolute as they represent current status. Ultimately it is for the UK marketplace and not this SEA to test whether the technologies are deemed to be suitably proven for purposes of bankability.

B4.2 Flexibility of the residual treatment system

The residual waste treatment technologies that are installed will have typical operational lives of 25 years. However, there is a need to consider whether the waste management system could respond to future changes in waste policy (for example, a higher Government target for recycling than that set by the Strategy) and factors such as changes in waste arisings (for example, higher arisings resulting from waste minimisation and re-use targets not being achieved).

EfW or ATT facilities need a specified waste throughput in order to release the amount of heat required to produce the rated amount of electricity. They also operate 24-hours per day. A higher recycling target or a higher waste minimisation target would reduce the amount of residual waste that was produced, and whilst this could make it more difficult for a thermal treatment facility to process the required tonnage of MSW, alternative waste sources (such as suitable commercial and industrial waste) could be used to meet the waste input target.

MBT facilities are more flexible than thermal treatment facilities as they can operate for one, two or even three shifts per day depending on arisings. This means that they would be more flexible in terms of responding to changes in residual waste arisings. However, this could result in the plant either failing to supply minimum tonnages of products if residual arisings reduced or having to landfill excess material if residual arisings increased and markets were not available for the additional tonnage of products which were produced.

B4.3 Public acceptance

Public acceptance and obtaining planning permission for all of the waste treatment processes will be required in order to implement the chosen scenario.

New facilities required will vary depending on the scenario modelled:

- Landfill capacity (Scenario 1)
- Mechanical biological treatment (MBT) plant (Scenarios 2, 3, 4, 5 & 6).
- Energy from waste (EfW) facility (Scenarios 7 & 8)
- Advanced thermal treatment (ATT) (Scenario 9)

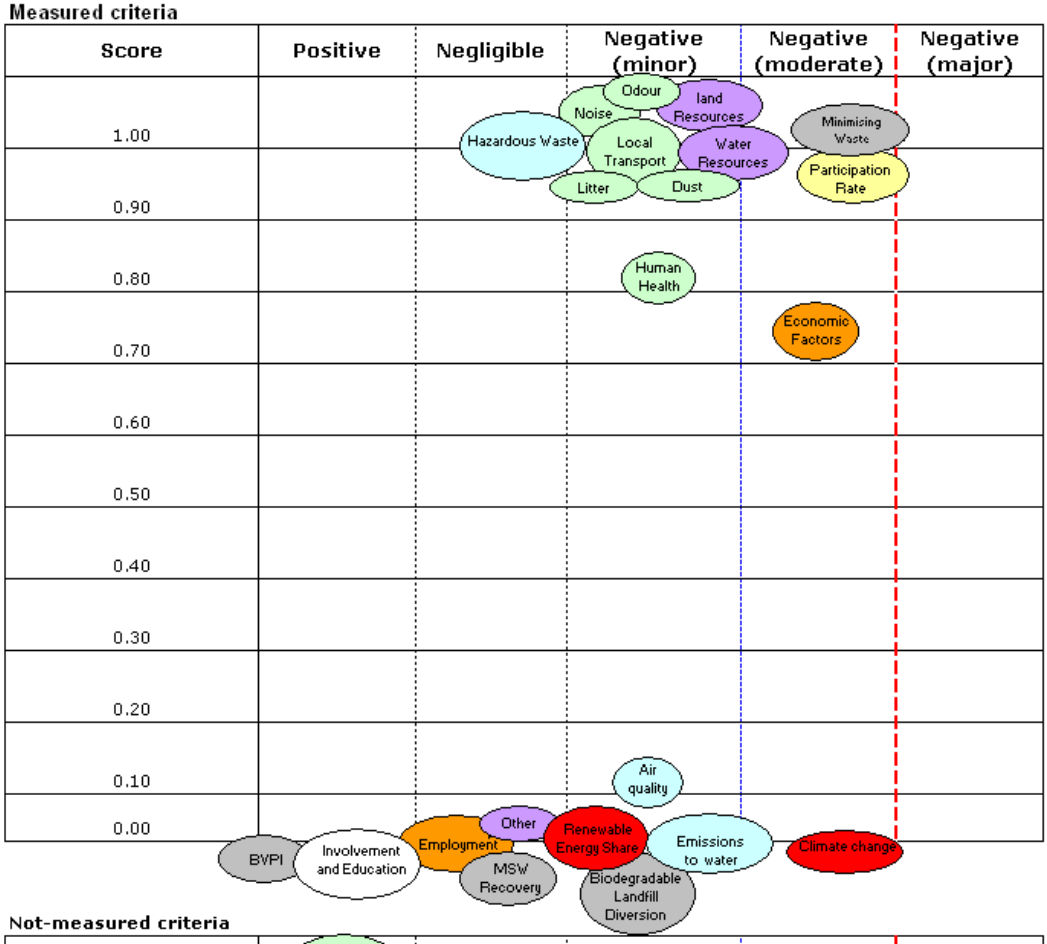
The MBT plant will also require landfill capacity to dispose of waste which is not suitable for processing and for the stabilised organic fraction.

The factors that are most likely to affect public acceptance for a new waste management scenario are the number and types of new facilities required, therefore there might be some level of opposition to any new waste management facility.

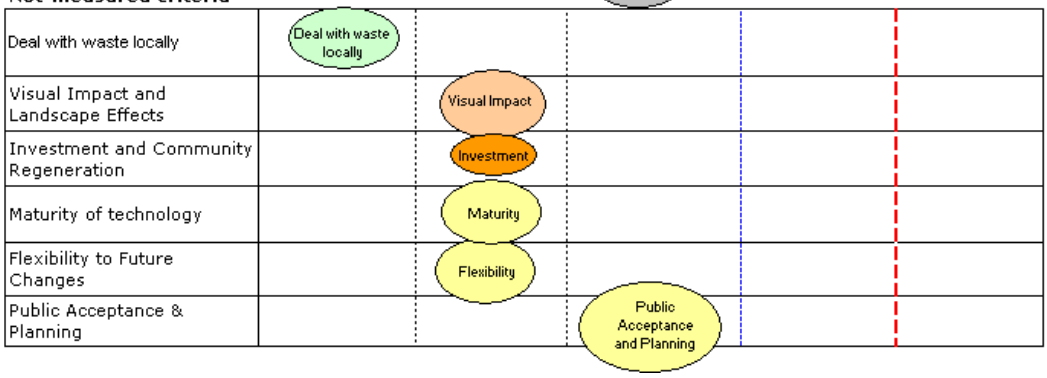
Appendix C: Scenario Specific matrix

Scenario 1 - Base Case

Measured criteria

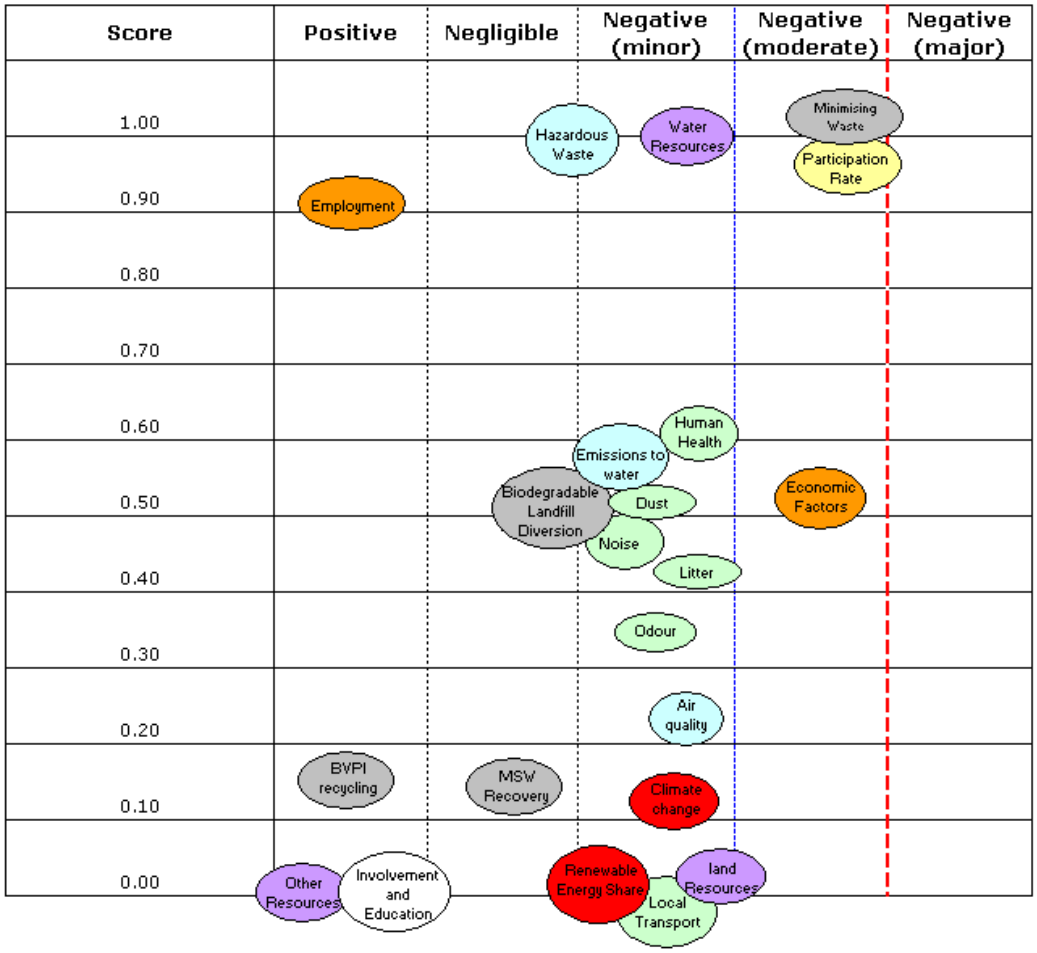


Not-measured criteria



Scenario 2 - MBT Aerobic

Measured criteria



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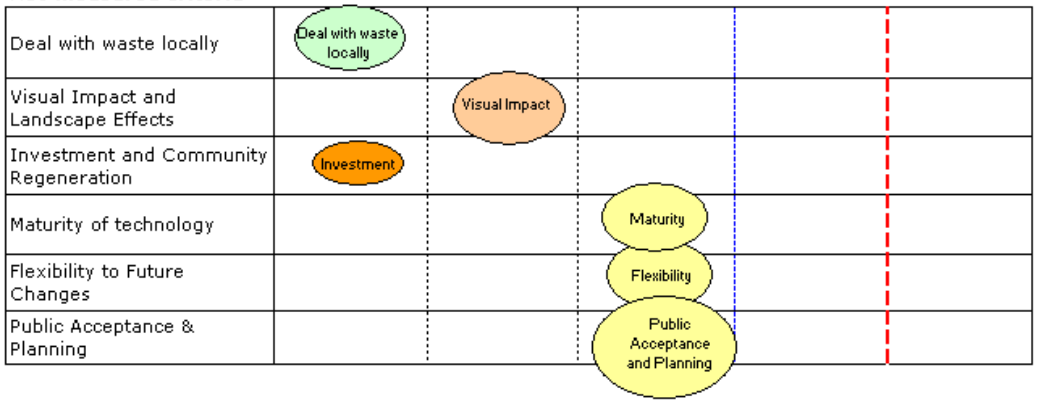
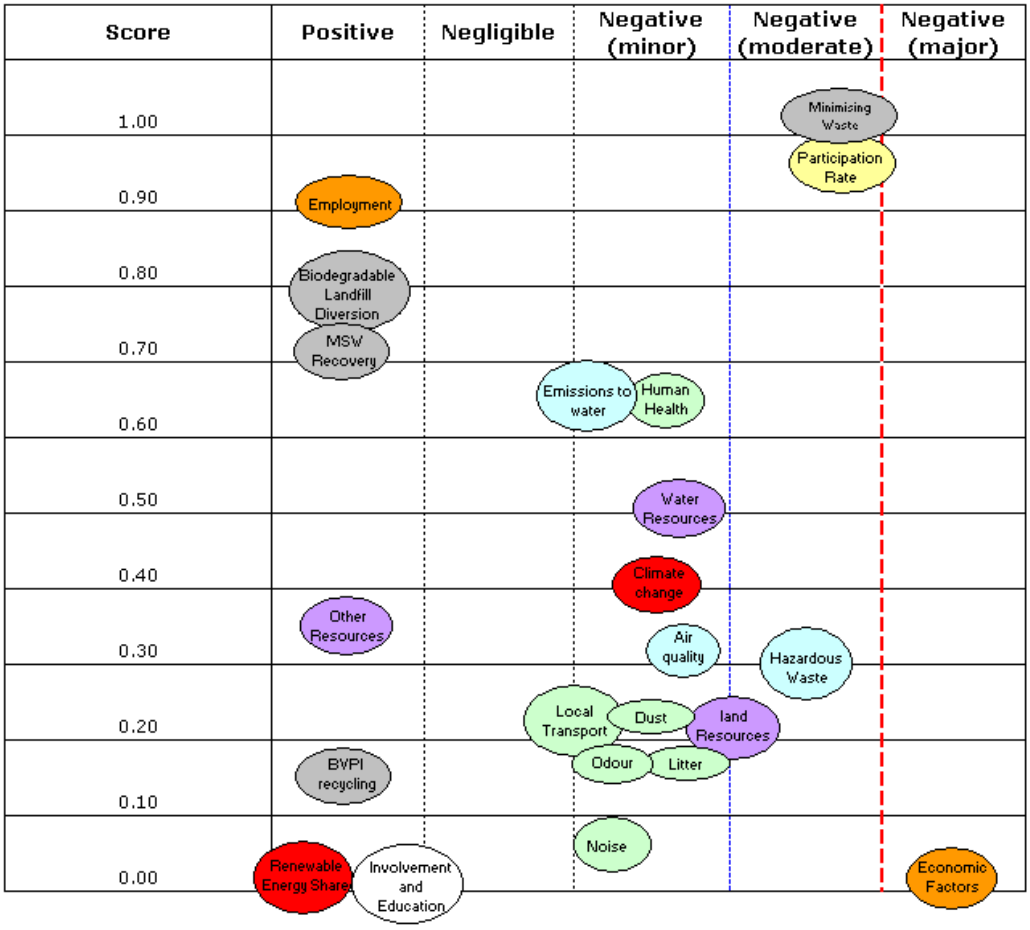


Scenario 3 - MBT RDF On site

Measured criteria



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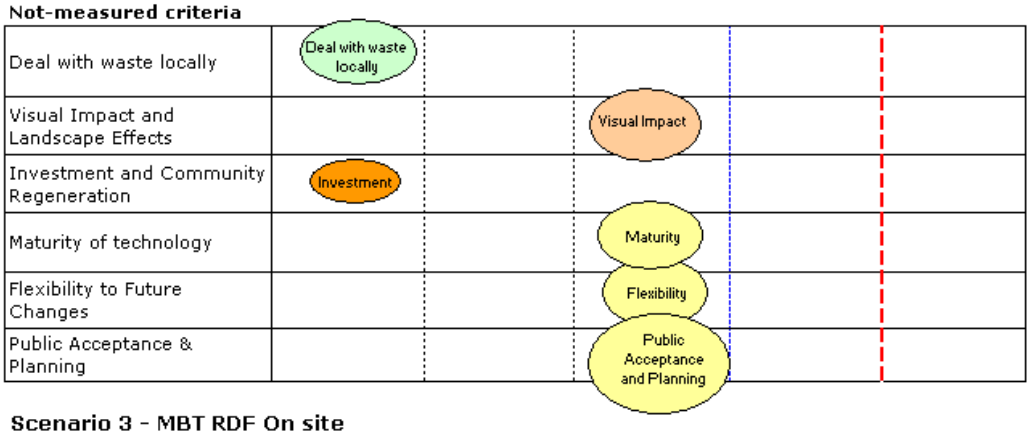
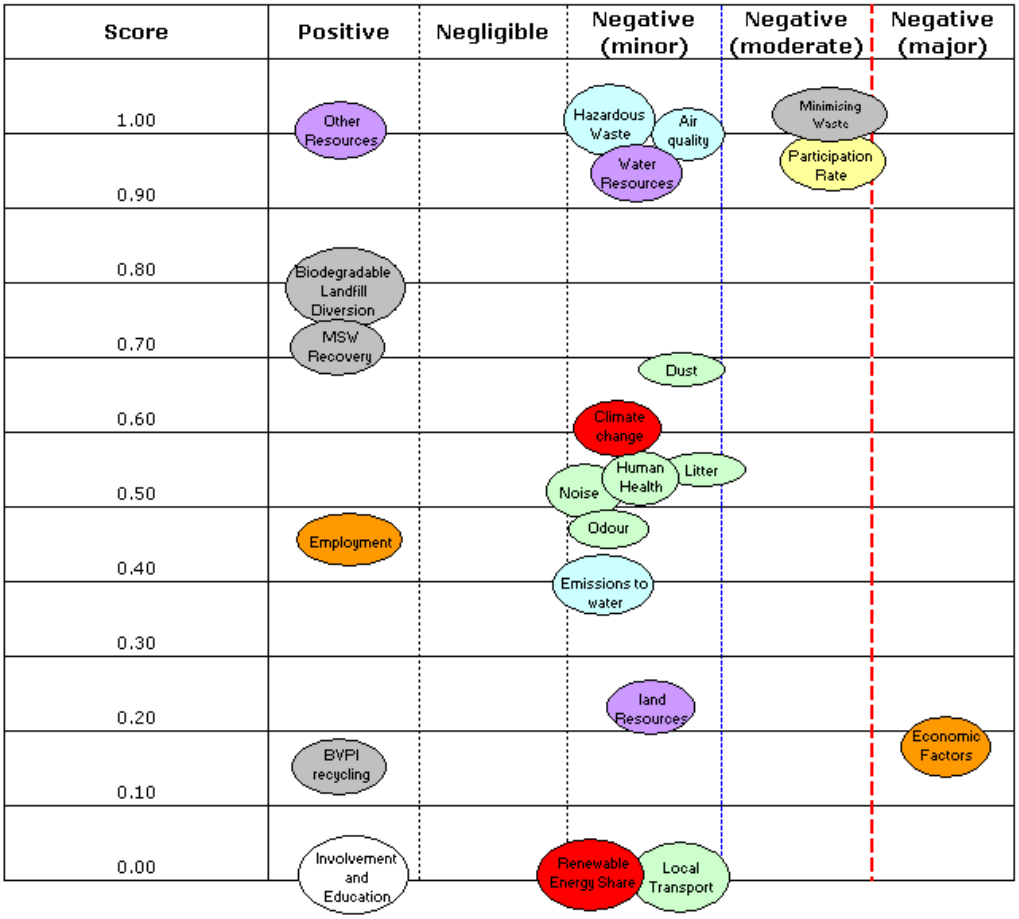


Scenario 3 - MBT RDF On site

Scenario 4 - MBT RDF to 3rd Party

Measured criteria



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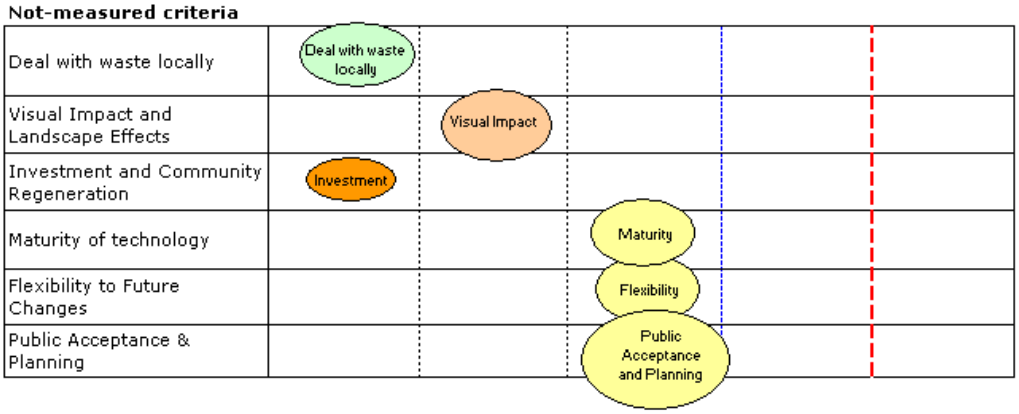
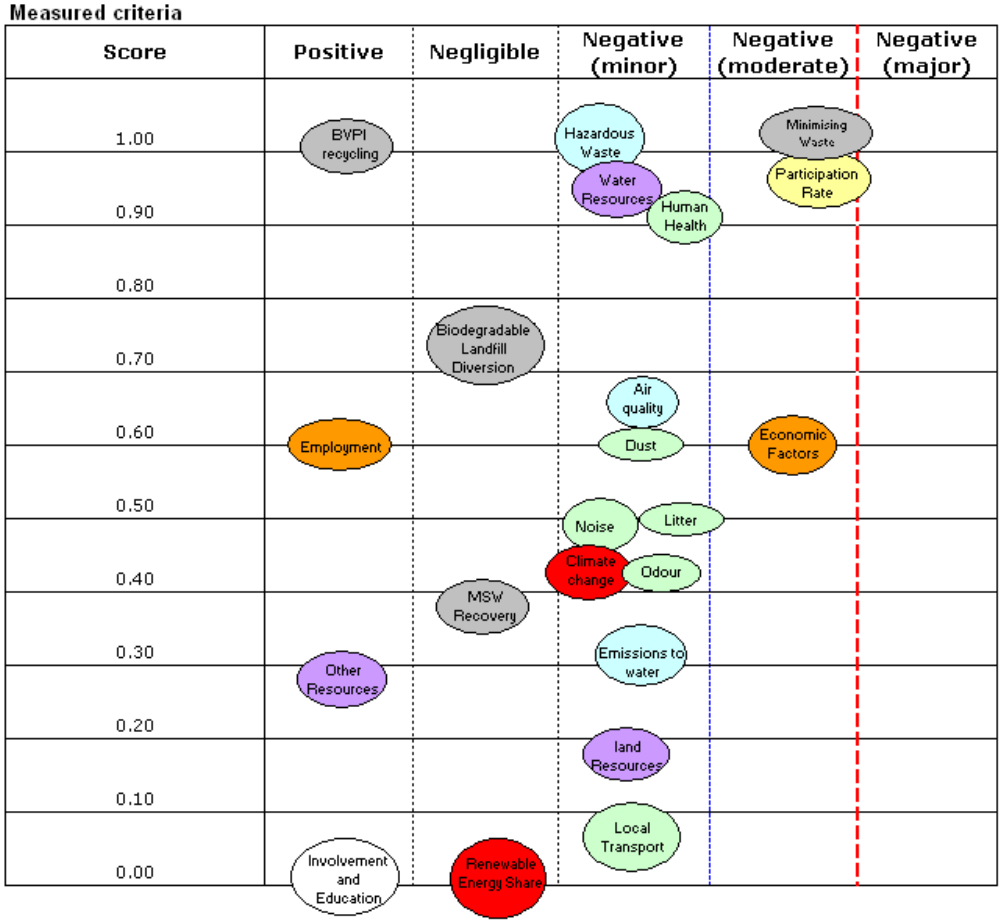


Scenario 5 - MBT AD and Aerobic

Measured criteria



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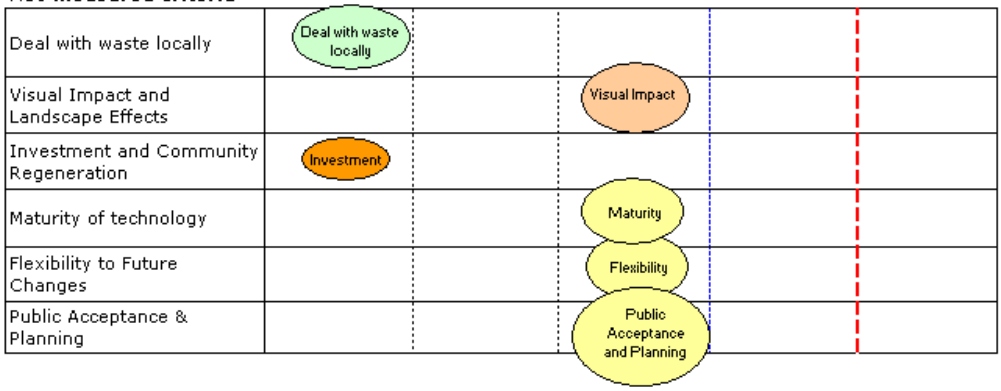
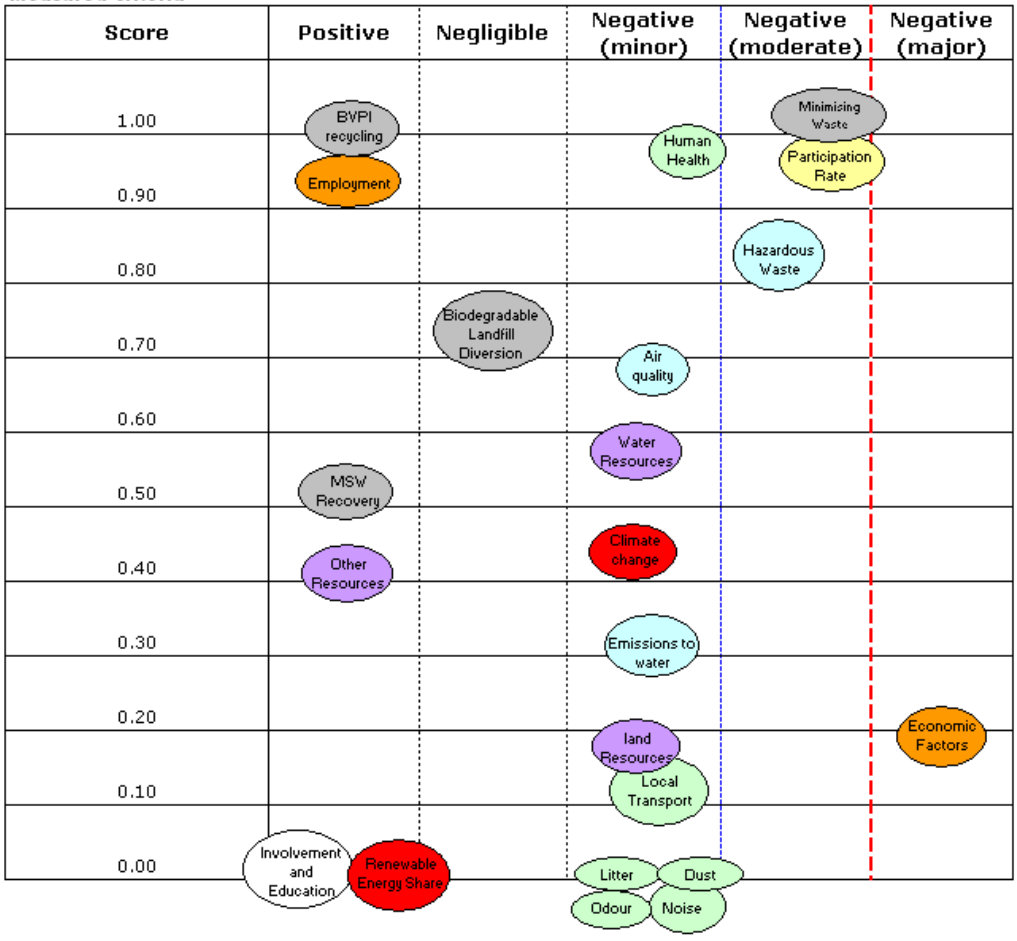
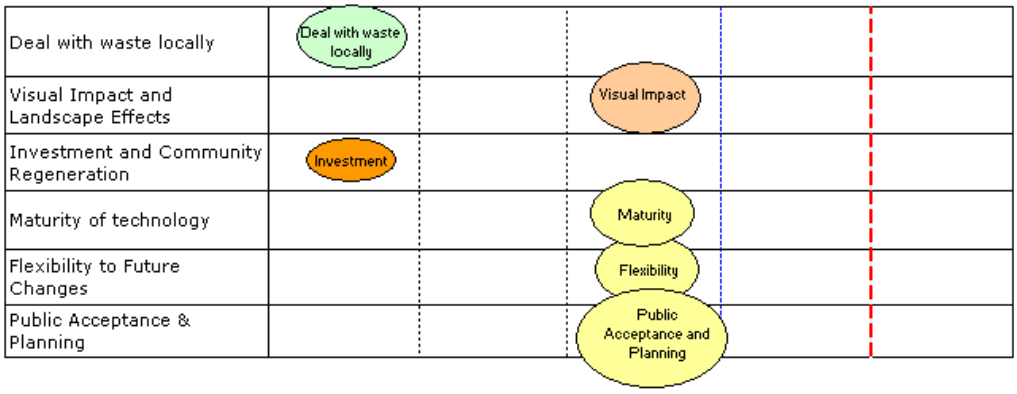


Scenario 6 - MET AD and Aerobic (RDF on site)

Measured criteria

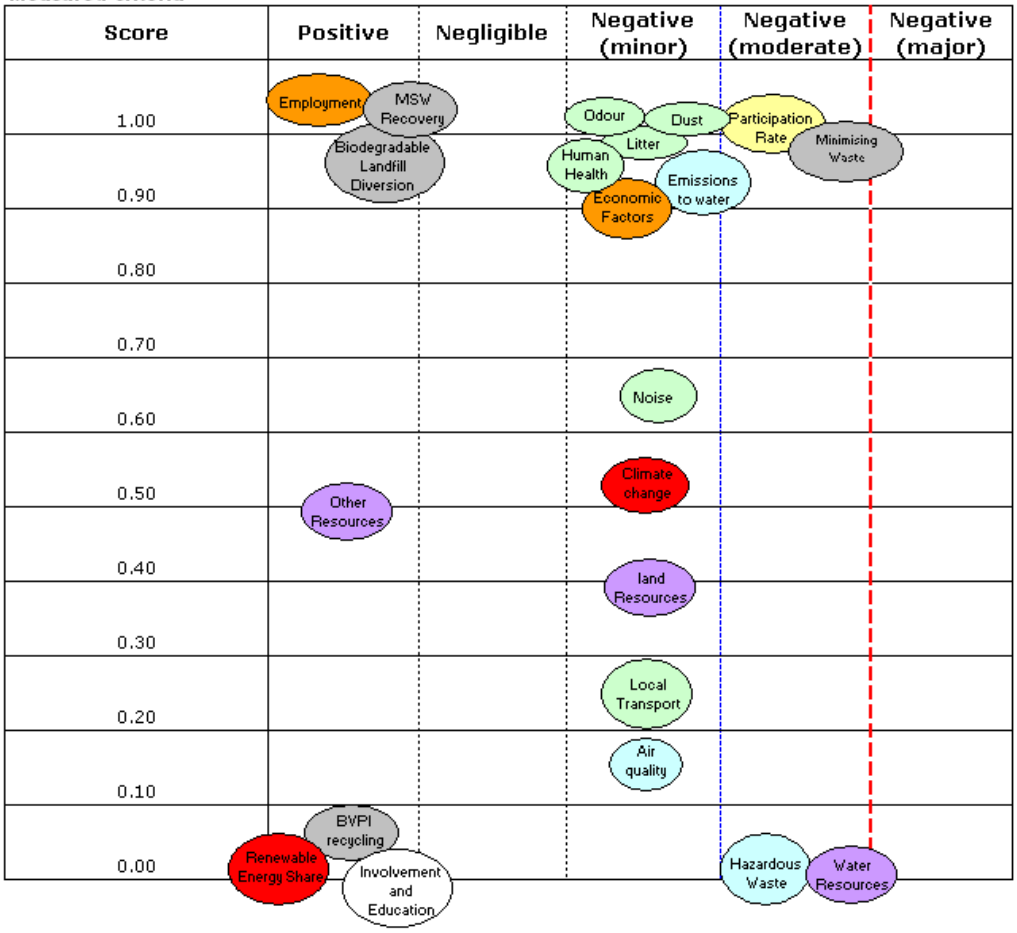


Not-measured criteria

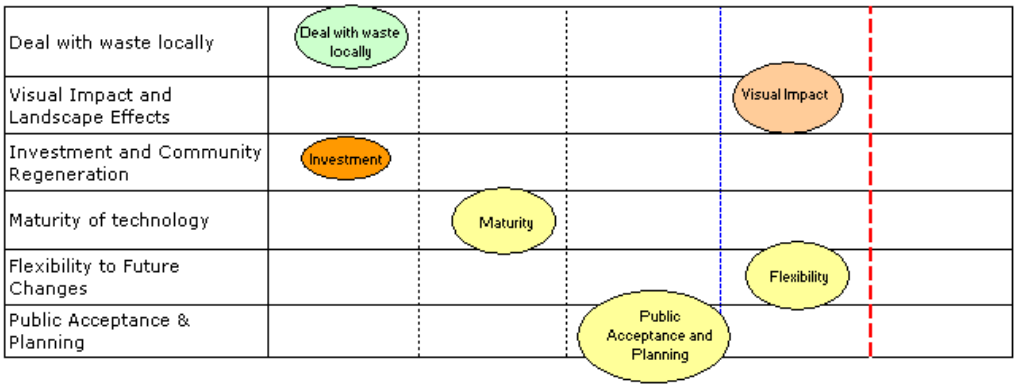


Scenario 7 - EfW

Measured criteria

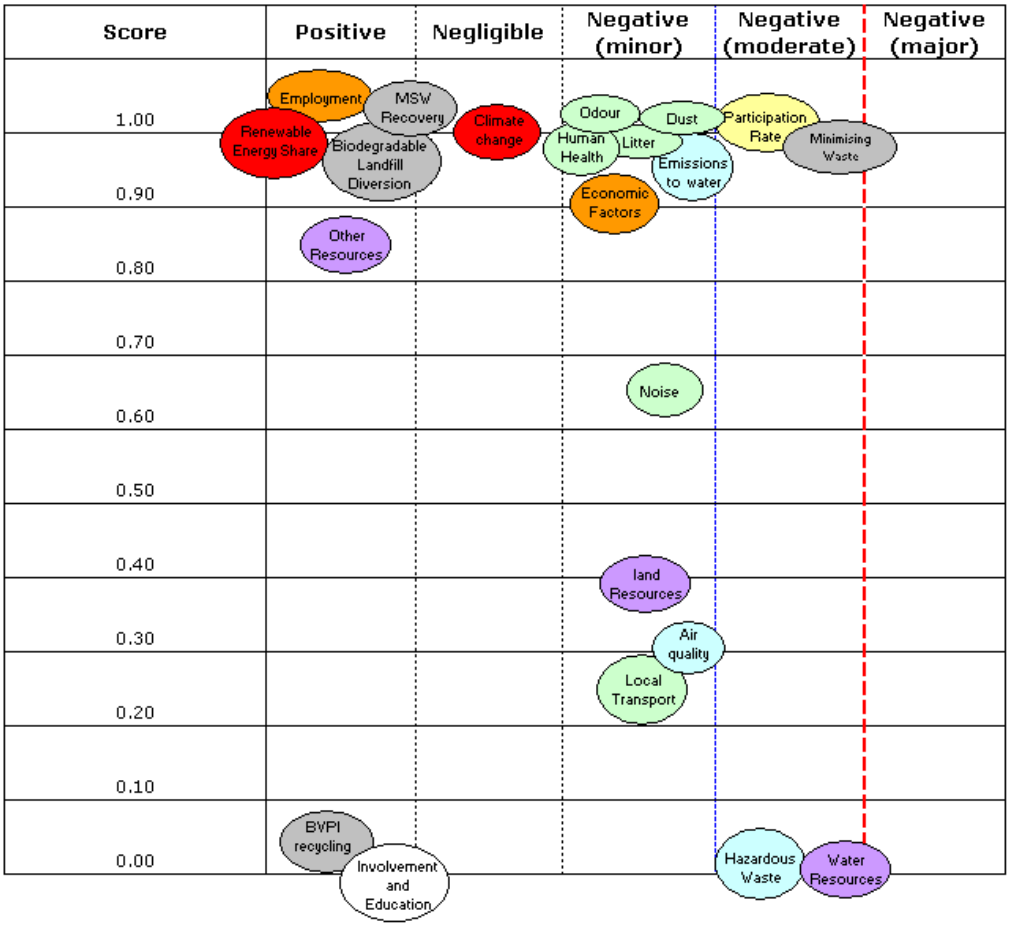


Not-measured criteria

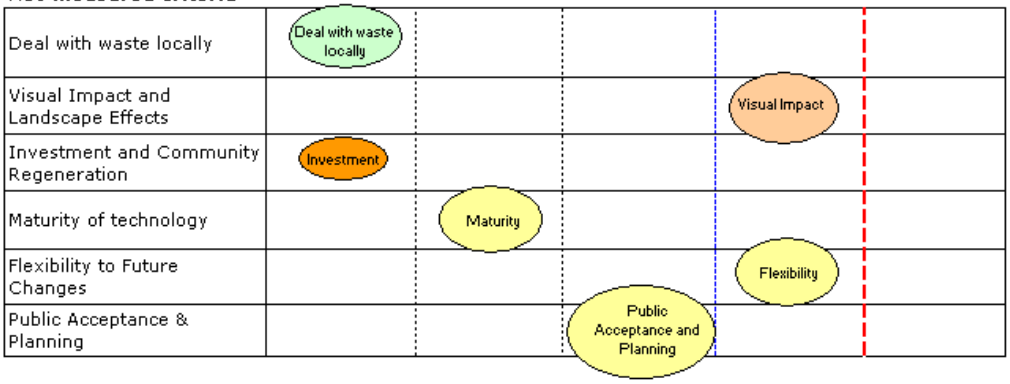


Scenario 8 - EfW & CHP

Measured criteria

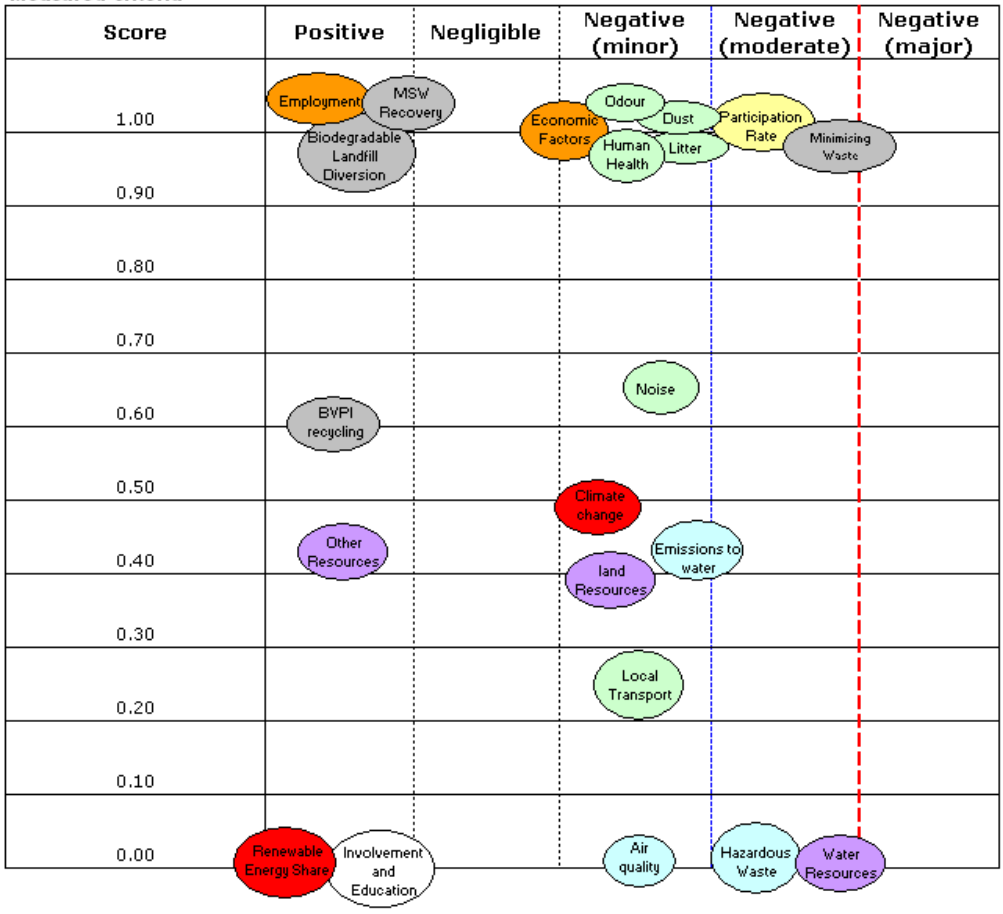


Not-measured criteria



Scenario 9 - ATT

Measured criteria



Not-measured criteria