

DEVELOPMENT OF A REGIONAL WASTE MANAGEMENT STRATEGY FOR THE EAST MIDLANDS: TECHNICAL REPORT

EXECUTIVE SUMMARY

BACKGROUND

The Waste Planning Process

1. To achieve the Government's targets for waste recycling/composting and recovery and reduced reliance on landfill will require significant investment in new and upgraded waste management facilities. The Government wishes to see regional strategies developed for meeting likely future demands for waste management. The Regional Waste Management Strategy (RWMS) for the East Midlands will inform the forthcoming review of Regional Planning Guidance for the East Midlands (RPG 8).

Scope of the Technical Report

2. The Technical Report identifies, evaluates and reports on options to deliver a sustainable and integrated waste management strategy for the East Midlands for the period to 2021, taking account of national and European policy and guidance. The Report addresses the four principal waste streams: municipal solid waste (MSW); commercial and industrial (C&I) waste; inert construction and demolition (C&D) waste; and special waste. The Report identifies the scale of waste management infrastructure that may be associated with future options. However, the knock-on implications for reprocessing and market development fall outside the scope of the study.

METHODOLOGY

Key stages

3. The development and appraisal of waste planning options involved the following:
 - Baseline assessment of existing and projected waste arisings
 - Identifying and agreeing objectives and indicators, covering environmental, socio-economic, cost and operational criteria
 - Development and modelling of a range of strategic waste planning options, which meet relevant targets and policy drivers
 - Evaluation of options against the objectives and indicators

- Sensitivity testing – to check the robustness of the preferred options.
4. The approach used is based on draft guidance prepared for the Office of the Deputy Prime Minister on Strategic Planning for Sustainable Waste Management: Guidance on Options Development and Appraisal (March 2002).

Consultation

5. Consultation is a critical part of the development of an effective and deliverable RWMS. Three consultation/dissemination events have taken place:
 - In May 2002, the RTAB and local authorities were consulted on a Baseline Assessment Report
 - In June 2002, a consultation seminar was held with the RTAB and key stakeholders to gain consensus on method of approach
 - In September 2002 the Draft Technical Report was presented to the RTAB and key stakeholders.

SUMMARY OF FINDINGS

Baseline assessment

Current waste arisings

6. In 1998/99¹, the East Midlands region produced approximately 16.0 million tonnes of waste. Of this, about 48% (including 2% special waste) was commercial/industrial in origin, 38% was C&I waste, and only 14% was MSW. Arisings of agricultural waste amounted to 5.34 million tonnes in 1998/99.
7. Nottinghamshire produced the largest proportion of total waste arisings (32% of the total excluding agricultural waste), followed by Derbyshire (22%), whilst Lincolnshire produced the least (12%).

Predicted waste arisings

8. The rationale for predicting waste arisings up to 2021 is described fully in the draft Technical Report. The forecasts can be summarised as follows:
 - In 2002 it is estimated that 16.6 million tonnes of waste will be produced within the region (22.3 million tonnes including agricultural waste)

¹ Most recent data provided the Environment Agency

- By 2021 approximately 18.4 million tonnes will be produced with the Region (25 million tonnes including agricultural waste)
9. The most significant component of the total arisings is C&I waste followed by C&D waste. The most rapidly growing waste streams are predicted to be MSW and commercial waste (both at around 2% per annum).

Existing and future waste management arrangements

10. Nearly 9 million tonnes of waste was treated in the East Midlands in 2000/01 (taking into account imports and exports of waste) and 2 million tonnes passed through transfer stations/Civic Amenity sites. 88% of this waste was sent to landfill, 9% was treated by physico-chemical means, 2% by energy recovery and 1% by biological treatment.
11. The study presents data on capacity of different treatment methods. Most significantly, at current rates of filling, landfill capacity is set to run out in less than 8 years time.
12. The study also provides data on proposed and permitted new facilities. Sixteen facilities have been identified, 12 of which are landfill sites. The new landfill sites will extend total landfill capacity by around 2 years.

Targets and constraints

13. In responding to the EC Landfill Directive, the Government published *Waste Strategy 2000*, the national waste strategy for England and Wales, in May 2000. The strategy contains national targets for the recycling and composting of household waste and the recovery of municipal waste. The national recycling/composting targets² are as follows:
- to recycle or compost at least 25% of household waste by 2005;
 - to recycle or compost at least 30% of household waste by 2010; and
 - to recycle or compost at least 33% of household waste by 2015.

The national recovery³ targets are as follows:

- to recover value from 40% of municipal waste by 2005;
- to recover value from 45% of municipal waste by 2010; and

² The recycling/composting targets are set for the combination of the rate for recycling household waste and the rate for composting household waste.

³ The recovery rate for municipal solid waste is comprised of the recycling rate for household waste, the composting rate for household waste, and the percentage of municipal waste from which value is recovered through, *inter alia*, combustion with energy recovery, anaerobic digestion and other forms of recycling.

- to recover value from 67% of municipal waste by 2015.
14. Regarding other waste streams, there is only one target in Waste Strategy 2000:
- by 2005 to reduce the amount of industrial and commercial waste sent to landfill to 85% of that landfilled in 1998.

Strategic waste planning options

15. The above-mentioned targets provide a framework for the RWMS for the East Midlands. However, these targets can be met (or exceeded) by various means.
16. The following five options are considered to represent a suitable range of different approaches for the Region. All the options meet the targets, with the exception of Option 0, which is a continuation of current performance.
- Option 0: Continuation of current performance with very low recycling/composting effort, very low energy from waste (EfW) and very high landfill
 - Option 1: Meet targets with the low recycling/composting effort, high EfW, and intermediate landfill
 - Option 2: Meet targets with the high recycling/composting effort, low EfW, and intermediate landfill
 - Option 3: Meet targets with an intermediate recycling/composting effort, intermediate EfW and intermediate landfill
 - Option 4: Exceed target s with an intermediate recycling/composting effort, high EfW, and low landfill.
17. The draft Technical Report sets out a sub-regional break down of waste management methods for each option for the year 2015, showing the tonnages of waste which each county will need to manage by each method (recycling/composting, energy recovery, disposal, treatment and re-use).
18. Total infrastructure requirements for the East Midlands are presented for each option, again with a sub-regional breakdown. These are based on assumed facility capacities (for material reclamation facilities (MRFs), compost plants (open windrow, enclosed MSW, in-vessel), inert processing plants, EfW plants, landfills, treatment facilities, CA sites, other transfer facilities and anaerobic digestion facilities).
19. Key characteristics of the options may be summarised as follows:

- The total number of facilities for all options ranges between 236 (for Option 0) and 278 (for Option 2).
 - For inert waste Nottinghamshire (including Nottingham City) is allocated by far the most facilities. Northamptonshire, followed closely by Lincolnshire is allocated the least number of inert facilities.
 - For non-inert waste Leicestershire (including Leicester City) is allocated the most facilities. Lincolnshire is allocated the least number of inert facilities.
 - Allocation of facilities to C&I waste combined (both inert and non-inert) is greater than MSW and C&D waste facilities allocation, reflecting the significance of C&I waste when all waste types are considered.
20. To determine the infrastructure requirement at the sub-regional level a number of important assumptions have been made, which are summarised in the draft Technical Report.

Evaluation of options: Process

21. The purpose of appraising the performance of waste planning options against the objectives and indicators is to inform decision-makers about their relative advantages and disadvantages. Twelve objectives have been identified against which to appraise the options, covering environmental, socio-economic, and operational and policy issues. Suitable indicators were defined to enable more precise measurement of performance (**Table 1**). The objectives and indicators were compared with those in the Regional Sustainable Development Framework, and agreed through the consultation process.

Table 1: Objectives and Indicators for Options Appraisal

Objectives	Indicators
Environmental Objectives	
1. To ensure prudent use of land and other resources	<ul style="list-style-type: none"> • Depletion of resources, such as wood, water, fuels and ores • Landtake
2. To reduce greenhouse gas emissions	<ul style="list-style-type: none"> • Greenhouse gases emitted
3. To minimise adverse impacts on air quality and public health	<ul style="list-style-type: none"> • Emissions which are injurious to public health • Emissions contributing to air acidification • Emissions contributing to depletion of the ozone layer • Extent of odour problems • Extent of dust problems
4. To conserve landscapes and townscapes	<ul style="list-style-type: none"> • Extent of visual and landscape impacts

Objectives	Indicators
5. To protect local amenity	<ul style="list-style-type: none"> • Extent of noise problems • Extent of litter and vermin problems
6. To minimise adverse effects on water quality	<ul style="list-style-type: none"> • Emissions contributing to eutrophication • Extent of water pollution
Socio-economic Objectives	
7. To minimise local transport impacts (congestion, severance, fear and intimidation, physical damage)	<ul style="list-style-type: none"> • Total waste kilometres (by mode) • Transport along roads other than motorways
8. To provide employment opportunities	<ul style="list-style-type: none"> • Number of jobs likely to be created
9. To provide opportunities for public involvement and education	<ul style="list-style-type: none"> • Extent of opportunities for public involvement and education (concerning sustainable waste management practices)
Operational Objectives	
10. To minimise costs of waste management	<ul style="list-style-type: none"> • Costs of collection, management and disposal, including material and energy revenues
11. To ensure reliability of delivery	<ul style="list-style-type: none"> • Likelihood of implementation within required timescale
Waste Management Policy Objectives	
12. To conform with waste policy	<ul style="list-style-type: none"> • Percentage recovery • Percentage recycled

22. Three methods have been used to appraise the performance of the options:
- **A quantitative assessment tool**, known as *WISARD*⁴, for appraising the effect of the options on resource use and emissions
 - **Generic data** on the performance of options, such as the typical size (land area) of waste management facilities, and the number of jobs likely to be created
 - **Professional judgement**, where generic data are not available, for example in relation to visual and landscape impacts and other local amenity issues.
23. A number of key assumptions have been made in order to carry out the appraisal. These relate to distance travelled by waste, transportation of waste from MRF to reprocessor, size of transport loads and the physical and operational characteristics of waste management facilities.

⁴ Waste Integrated Systems Assessment for Recovery and Disposal (*WISARD*)

Appraisal results

24. The appraisal has been undertaken systematically by scoring each scenario against each indicator. The resulting 'performance matrix' is a valuable aid to decision-making in itself. However, direct use of the results it contains is difficult because of the complexity of the matrix and the use of different units.
25. Through a process of 'valuing' performance, in which scores in different units are all placed on a common scale of 0-1, it is possible to derive a total score and compare the overall performance of options.
26. This process indicates that overall Option 4 performs best, and Option 0 the worst. Option 4 exceeds targets with an intermediate recycling/composting effort, high EfW, and low landfill; while Option 0 is a continuation of current performance. The ranking is as follows:

Ranking of total valued performance

Options	0	1	2	3	4
Ranking Of Total Scores	5	3	4	2	1

27. However, this assumes that each indicator is of equal importance, whereas in practice, decision-makers may wish to attach more importance to some indicators or criteria than to others. Eliciting and applying 'weights' to the valued performance information can capture the relative importance of indicators.
28. The Consultation Seminar in June 2002 provided an opportunity to elicit a 'weight set' for the indicators. This was achieved by means of a 'points distribution' approach, whereby participants were invited to indicate their order of preference for the indicators. When aggregated, certain indicators were weighted particularly heavily (notably depletion of resources, emissions which are injurious to public health, costs of collection, management and disposal, and likelihood of implementation).
29. When these weights are applied to the valued performance, the ranking of the options is as follows:

Ranking of total weighted scores

Options	0	1	2	3	4
Ranking of total weighted scores	5	4	2	3	1

30. The result of applying weightings to the scores is that Option 4 is still the preferred option, and Option 0 is still the worst performing. The relative performance of the other three options has now altered. Option 2 is now the second best performing, whereas it was the second worst. Options 3 and 1 have become less favourable.

31. The performance of options has also been considered against the separate groups of objectives. Performance against environmental, socio-economic and operational objectives is shown separately below.

Ranking of total weighted scores for environmental indicators

Options	0	1	2	3	4
Ranking of total weighted scores	5	4	2	3	1

Ranking of total weighted scores for socio-economic indicators

Options	0	1	2	3	4
Ranking of total weighted scores	5	4	1	2	3

Ranking of total weighted scores for operational indicators

Options	0	1	2	3	4
Ranking of total weighted scores	1	2	4	3	5

32. The performance of options in terms of environmental objectives is the same as for the overall performance, with Option 4 performing best, and Option 0 worst. In terms of socio-economic objectives, Option 2 performs best, and Option 0 worst. In terms of operational indicators, however, Option 0 performs best, and Option 4 the worst. This demonstrates the tension between deliverability/cost and achieving environmental and socio-economic objectives.

Sensitivity testing

33. Sensitivity testing has been carried out to examine how sensitive the results are to variation in the weights set, and how robust the choice of option. Sensitivity testing has included:
- Inverting the original weights (a mathematical exercise to test robustness);
 - Applying a new set of weights elicited from members of the RTAB. These place greater emphasis on the importance of operational indicators.
34. The results of this process are shown below.

Ranking of total weighted scores (inverted original scores)

Options	0	1	2	3	4
Ranking of total weighted scores	5	4	2	3	1

Ranking of total weighted scores (new weights)

Options	0	1	2	3	4
Ranking of total weighted scores	5	2	4	3	1

35. As can be seen, following both forms of sensitivity testing, Option 4 performs best overall and Option 0 worst. This indicates the robustness of the preferred option. However, the relative performances of the intervening options, all of which meet the targets, vary depending on the weightings applied.
36. The application of the new weights results in the rankings for options 1 and 2 being switched. Option 1 has changed from being ranked fourth (second worst) to second best, and option 2 has moved from second to fourth. The inversion of weightings has the same effect.

OVERVIEW OF FINDINGS

37. The appraisal demonstrates the strengths and weaknesses associated with each option, and that no option outperforms the others against all the indicators.
38. Based on performance scores derived from a combination of *WISARD* assessment, generic data and professional judgement and the weightings established through the consultation exercise, Option 4 has emerged as the preferred option and Option 0 as the least preferred. Option 4 exceeds the Governments targets with respect to waste recovery and recycling, and Option 0 is a continuation of current performance.
39. Option 4 performs strongly against most of the indicators. Notable exceptions to Option 4's high scores are the indicators relating to the extent of visual and landscape impacts, costs, and likelihood of implementation within the required timescale. This is due to the relatively high overall number of facilities involved, and in particular to the significant contribution of energy from waste. These are very significant indicators.
40. However, even when operational criteria are weighted more heavily, Option 4 still performs best. Conversely, Option 0 performs well against operational criteria. However, this is offset by very poor performance against most environmental and socio-economic indicators.
41. It is anticipated that the consultation process with respect to the RWMS will provide an opportunity to consider further the data underpinning

the performance of options, the weighting attached to indicators, and the potential for option refinement – to secure maximum environmental and socio-economic benefit, while minimising costs and operational constraints.