

Joint Municipal Waste Management Strategy – Annex D

EXECUTIVE SUMMARY

INTRODUCTION

The Joint Municipal Waste Management Strategy (JMWMS) is currently being reviewed by the waste disposal authorities of Worcestershire and Herefordshire, in partnership with their constituent waste collection authorities (the Partnership).

The JMWMS aims to promote waste minimisation but, inevitably, some residual municipal solid waste (MSW) will continue to be generated and will need to be managed. Residual waste managed by the Partnership is mostly disposed to landfill at present but this cannot continue due to changing legislation, the rising cost of landfill and a lack of capacity. Furthermore, the Partnership wishes to address the challenges of climate change and believes that, wherever possible, waste should be viewed as a resource.

A long list of possible options for treating the residual waste was developed for the Partnership to review. After consideration, the following final short list of options to be appraised was agreed:

- Option A – a single Energy from Waste (EfW) facility
- Option B – a single EfW facility with combined heat and power (CHP)
- Option C – two Mechanical Biological Treatment (MBT) facilities, located on two separate sites, one with on-site combustion.
- Option D – two MBT facilities each with off site combustion
- Option E – a single autoclave
- Option F – two autoclaves, located on separate sites
- Option G – EfW located out of county

The options listed above were assessed against a range of environmental, social and economic criteria. A workshop was held with both Officers and Members of the Partnership to agree the criteria and to ensure that any specific concerns that an authority had were identified.

The required capacity for the residual waste treatment facility(ies) is assumed to be 250,000 tonnes per annum. This is based on an assumed growth rate; predicted recycling and composting performance; and sending 10% of untreatable residual waste directly to landfill.

Assessment of the different options against the environmental criteria was undertaken using the Environment Agency's life cycle assessment tool - Waste and Resources Assessment Tool for the Environment (WRATE). The assessments against the remaining criteria were undertaken using both quantitative and qualitative appraisal methods.

The results of the appraisal are summarised below.

ENVIRONMENTAL CRITERIA

Criteria	Results Summary
Resource Depletion	Resource depletion potential estimates the amount of extraction of scarce minerals and fossil fuels. Option D was found to be the best performing option in terms of resource depletion because of the offsetting of fossil fuel used in the cement kiln. Option B performs well due to the conversion of waste into electricity and heat energy.
Freshwater Ecotoxicity	Freshwater aquatic ecotoxicity potential is a measure of the detrimental effects to aquatic organisms from exposure to toxic substances such as heavy metals. The results suggest that the recycling performance of the facilities is closely coupled with a favourable ecotoxicity score and options C-F score very well for this reason.
Greenhouse Gas Emissions	Global warming potential assesses the amount of carbon dioxide and other gases emitted into the atmosphere that cause global warming. Due to the increased efficiency of the plant in option B, it is by far the best option and although options E and F perform well in terms of reduced greenhouse gas emissions due to increased recycling, this is counter-balanced by the impacts associated with the actual treatment technology.
Air Acidification	Acidification potential relates to the release of acidic gases, such as sulphur dioxide, which can form 'acid rain' and damage ecosystems. Increased recycling in options E and F is again significant and these are the best performing options against this criterion. Option G is the worst performing due to the high impact of the treatment technology for this option.
Eutrophication	Eutrophication potential reflects the amount of nitrate and phosphate released. High concentrations of these compounds in water can encourage excessive algal growth, thereby damaging ecosystems through reduced oxygen supply within the water. Again, recycling strongly influences the result and options E and F are the best performing options in this assessment. The greater amounts of materials landfilled in options C and D results in lower scores against this criterion.

SOCIAL CRITERIA

Criteria	Results Summary
Health	Human toxicity potential is a measure of the impacts on human health and the results indicate that the majority of options have a beneficial impact, which can be accredited to increased recycling and the offsetting of burning fossil fuels. Options E and F perform best because they recycle the most. The creation of energy from waste in option B is also highly beneficial.
Transport	This accounts for the associated risks/impacts of transporting waste and assumes that the waste is moved by road. The greater the distance travelled, the worse the score, as more distance increases the risk of accidents, congestion and has a greater impact on local communities. Owing to the low levels of onward transport from the facilities, options A and B score well while option F performs the worst.

FINANCIAL AND RISK CRITERIA

Criteria	Results Summary
Costs	The financial cost associated with each waste management option has been considered. Capital (CAPEX) and operational (OPEX) costs, landfill tax and the costs of landfill and hazardous landfill were all included in this assessment. CAPEX typically includes civil engineering works, all external works and all process plant costs while OPEX includes labour, maintenance, consumables, insurances and overheads. Option C has the largest total cost, closely followed by option D.
Reliability of Delivery	Newer types of waste treatment technology that are largely untested in the UK may face problems with both implementation and funding. Facilities that have not been shown to work at large scale in the UK are therefore given lower scores. Options E and F were the only options not to achieve the top score.
Planning Risk	The options involving the use of two sites are considered to incur the greatest risk as they require two Planning Permissions. Hence options C and D are considered to be the worst options in terms of planning risk. There are already planning approvals in place for two autoclave facilities within the authorities and so options E and F are assumed to have a low planning risk. A sensitivity analysis has been carried out to reflect the fact that the planning permissions for the autoclave facilities have since lapsed.
Compliance with Policy	This criterion assesses how closely each of the options matches national waste policy in terms of how the waste is managed. Government policy seeks to drive the management of waste up the waste hierarchy and the JMWMS aims to maximise value from the residual waste and use it wherever possible as a resource. Taking this into account, option B performed the best, followed closely by options E and F, due to the management of waste at or near the top of the waste hierarchy. In contrast, option C was found to be the worst because it involves a large amount of waste being sent for disposal.
Flexibility	The options were assessed for their flexibility in terms of ability to accept waste with differing compositions. This is important because waste composition can change in the short term, for example due to seasonal variations, and in the longer term due to potential changes to packaging material etc. Options A, B and G are the better performing options and can accept a relatively large range of waste compositions. Options C and D, on the other hand, require stricter controls over the mix of materials for their input. In terms of flexibility to varying quantities of input, option C performed well because additional capacity can be added in a modular fashion. Options D, E & F perform less well than C because they would typically require a minimum supply contract for the RDF and autoclave fibre. The worst performer against this criterion was option G.
End Product Liability	The options with the least liability associated with their end products, and therefore the best performing, are options A and B. Due to the relatively high risk associated with finding a market for the autoclave fibre, options E and F have the highest liability.

OVERALL RESULTS AND CONCLUSIONS

The appraisal has assessed each of the options against fourteen criteria. A ranking has been devised based on the performance against all of these criteria. The ranked order of options is shown in *Table 3.1*.

Option B scores the best overall; however the criteria were not weighted, so no criteria are assumed to be more important than any others. Members of the Partnership highlighted cost, reliability and resource depletion as the most important criteria. With the exception of cost, option B scored well against these key criteria. If the potential income from the heat generated by option B is also taken into consideration, this option will also have a lower overall cost than assumed by this assessment.

Option E was ranked second overall and scored well against many of the environmental criteria, however it did not score well against the resource depletion or reliability criteria and was scored as average against cost.

Option D performed very well in terms of resource depletion and reliability, but poorly in terms of cost. The overall ranking for option D was sixth, reflecting lower performance against compliance with policy, cost and some of the environmental criteria.

Option A also performed well against two of the key criteria - cost and reliability. It also finished third against resource depletion, the other key criterion, and finished third in the overall scoring. This was due to a lower performance against some of the environmental criteria.

Option G is the worst performing option. The reliance on an out of county facility means the option performed badly in relation to flexibility in terms of quantity of throughputs and also against the transportation criterion. This option also performs poorly against the environmental criteria. This is partly as a result of assessment assuming this option is similar to the Coventry EfW, rather than a new, more efficient, EfW technology. To assess the impact of this assumption, a sensitivity analysis was undertaken. This further analysis did change slightly the results of option G (moving it from 7th to 6th place). However, it didn't result in any significant changes to the top performing options.

Table 3.1 Total Scores and Ranks

	Resource Depletion	Global Warming	Ecotoxicology	Acidification	Eutrophication	Health	Transport	Cost	Reliability	Risk	Planning Risk	Compliance with Policy	Flexibility - composition	Flexibility - tonnage	End Product Liability	Average	Rank
Option A	3	6	7	6	5	4	1	1	1	4	5	1	2	1	3.36	3	
Option B	2	1	6	5	3	3	1	5	1	4	1	1	2	1	2.57	1	
Option C	4	5	1	4	4	5	3	7	1	6	7	6	1	5	4.21	5	
Option D	1	4	4	3	6	6	4	6	1	6	6	6	6	3	4.43	6	
Option E	6	2	2	1	1	1	5	2	6	1	2	4	4	6	3.07	2	
Option F	7	3	3	2	2	2	7	2	6	1	2	4	4	6	3.64	4	
Option G	5	7	5	7	7	7	6	4	1	1	4	1	7	4	4.71	7	

KEY:

Option A	1 x EFW
Option B	1 x EFW + CHP
Option C	2 x MBT - gasification
Option D	2 x MBT - cement kiln
Option E	1 x Autoclave
Option F	2 x Autoclave
Option G	EFW out of county

