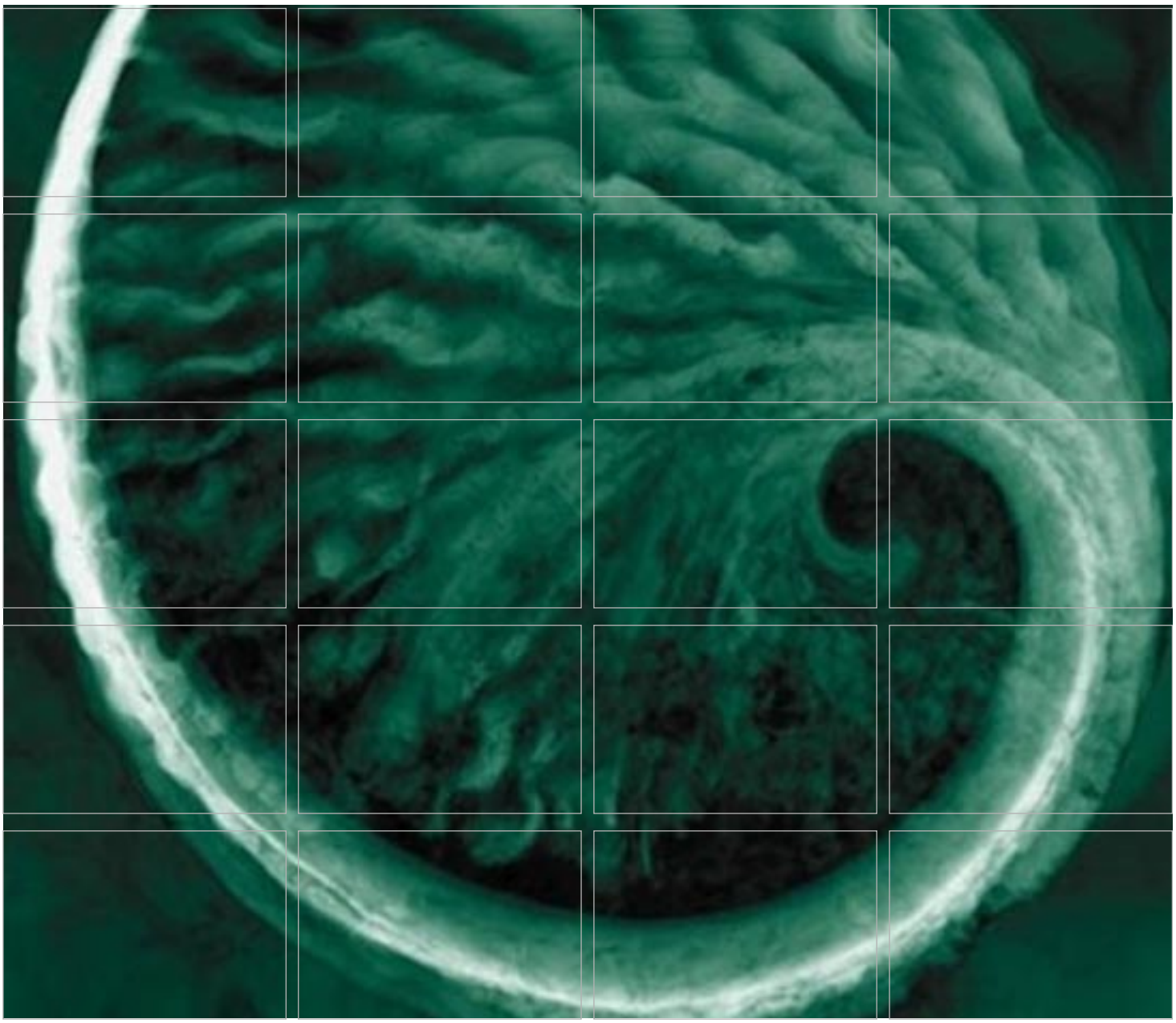

Recycling and Composting Appraisal

Executive Summary to Annex 4

Report

March 2006

Delivering sustainable solutions in a more competitive world

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Kent Waste Forum

Recycling and Composting Appraisal

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For and on behalf of
Environmental Resources Management

Approved by: Simon Aumônier

Signed: 

Position: Partner

Date: 31st March 2006

1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

The development of a municipal waste management strategy (MWMS) for Kent involves taking strategic decisions. The recycling and composting options modelled in this report will help to inform these decisions as part of the development of this strategy. These options present collection systems that have the potential to be implemented individually, or in combination; and provide various indicative ways for achieving increased recycling performance and helping Kent meet its statutory targets.

In order to assess and to appraise these options, a number of environmental, social and economic criteria were developed. This approach will help the Kent authorities with the strategic decision-making process by identifying the potential environmental, social and financial costs of each option.

1.2 CRITERIA SELECTION AND OPTION DEVELOPMENT

A technical options appraisal requires that the performance of options be assessed through a range of criteria in order to identify the option(s) that performs best overall.

The recycling and composting options were identified through consultation with the Kent Waste Forum and the wider stakeholder network. These options build on the baseline collection system to provide additional capacity and/or to achieve higher rates of recycling and composting. The options developed are shown in *Table 1.1* below.

Table 1.1 Recycling and Composting Options

Option	Description
Option A	Raise participation and capture rates of current recycling collections to 80%
Option B	Increase coverage of recycling and composting collections to 100% and increase participation and capture to 80%.
Option C	Expand glass collections to all households.
Option D	Introduce compostable kitchen waste collections to all households.
Option E	Expand garden waste collections to all relevant households.
Option F	Expand the current cardboard collections to all households.
Option G	Collect dense and film plastics from 100% of households.
Option H	Collect tins and cans from 100% of households.
Option I	Add kitchen and cardboard to current garden waste collections.
Option J	Collect commingled plastics and tins and cans from 100% of households.
Option K	Increase recycling at bring sites by 15%.

Option	Description
Option L	Increase recycling at bring sites by 20%.
Option M	Expand the range of bring sites to include dense and film plastics.
Option N	Increase recycling at the HWRCs to 60%.
Option O	Increase recycling at the HWRCs to 75%.

The principal assumptions made for each option during the modelling are discussed in detail in *Section 1.3* of the main report.

Workshops were held with each of the Districts and Kent County Council (KCC) to identify the assessment criteria appropriate for Kent. These were then agreed by the Kent Waste Forum. A detailed list of the assessment criteria chosen is shown in *Table 1.1* of the main report.

1.3 APPRAISING THE RECYCLING AND COMPOSTING OPTIONS AGAINST PERFORMANCE CRITERIA

The methods used for assessing the recycling and composting options against each of the criteria are explained and the results of this modelling process are presented. The following sections describe each criterion and what makes them perform well or badly. A table presenting a summary of all the results is given below.

1.3.1 Impact of Resource Use (Resource Depletion)

Resource depletion is an important concern because current levels of consumption of non-renewable resources are thought to be unsustainable. Crude oil, coal and gas are natural, non-renewable resources and therefore limited.

Options that perform well against this criterion result in increased recovery of resources from material recycling and landfill gas recovery. This recovery has to outweigh the resource depletion costs of waste processing and transport. Producing virgin plastic is highly resource intensive, and therefore recovering this resource will result in significant resource depletion benefits.

Options perform badly if the costs of waste processing and transport are higher than the potential benefit from resource depletion. For example, Option F aims to expand the current cardboard collection. This will not produce significant benefits as the virgin material displaced has a relatively lower depletion impact.

1.3.2 Air Pollution (Acidification)

Acidification is the process by which air pollution results in the deposition of acid substances, for example as 'acid rain' which damages forests and lakes.

Other effects include its impact on freshwater and coastal ecosystems, soils and ancient monuments. Acidification can result in the pollution of water sources and increased uptake of metals by flora and fauna.

High performing options will result in significant acidification benefits through displacing virgin materials. Option J performs well because it involves the collection of plastics, tins and cans from the household to be recovered and reused thereby avoiding the need for the same quantity of virgin materials.

Options that perform least well involve the collection of materials that deliver a lower acidification benefit (ie the virgin materials, such as compost or paper, have a relatively lower acidification impact).

1.3.3 Emissions of Greenhouse Gases

Human activities have altered the chemical composition of the atmosphere through the build-up of greenhouse gases. The higher the concentration of these gases, the higher the heat-trapping capability of the earth's atmosphere.

Options that increase the quantity of metals recycled perform well, as the displacement of virgin metal production results in a significant greenhouse gas benefit. Diverting biodegradable waste from landfill also affects the performance against this criterion. Therefore options targeting green and kitchen waste perform better than in previous criteria.

Option F, for example, diverts only small tonnages of cardboard and performs poorly.

1.3.4 Energy Consumption

Energy consumption is an important factor in sustainability, affecting all aspects of development. By using less energy, carbon emissions can be reduced and energy supplies can be secured. There is a degree of double-counting between this criterion and some of the others assessed, for example resource depletion and air acidification and greenhouse gas emissions, since these are all connected with energy consumption.

Options that perform well result in less energy being used through material recovery rather than through the production of virgin materials. Producing virgin plastics is energy intensive and recovering this resource will result in energy consumption benefits.

Options performing badly include those relating to kitchen and garden waste. The production of the virgin material does not require high energy consumption; therefore the benefits are not as apparent when using recovered materials.

1.3.5 Impact on Human Health

The release of chemical compounds into the environment is of major concern due to the potential for harm to humans and the natural environment. The potential harm that may result from emissions of chemical compounds to the environment has been assessed.

High performing options depend on the quantity of non-ferrous metals separated for recycling. For example, the production of virgin aluminium generates a significant human toxicity potential through the release of toxic substances and high electricity consumption. Processing scrap metal to produce secondary aluminium has reduced toxicity implications resulting in non-ferrous metal recycling being a high performing option.

Plastics and glass recycling are awarded a relatively lower benefit than for the other options and therefore perform less favourably.

1.3.6 Impact on Water Pollution

According to a recent review by Enviros Consulting Ltd (1), generally there are unlikely to be significant impacts to water quality associated with recycling and composting facilities, and therefore an appraisal of this criterion is not appropriate.

1.3.7 Road Transportation

Reducing road traffic and the need to travel by road is a key factor in sustainability objectives. An assessment was made of the expected road distance travelled for alternative options to indicate the impact on local transport on each option.

Options performed well if the materials were transported locally, specifically within Kent.

Options performing poorly if the materials needed to be transported longer distances. For example, options involving plastic recycling performed badly as the material needed to travel to the north of England for reprocessing.

1.3.8 Financial Costs

Kerbside Recycling and Composting Option

Costs were calculated for four 'standardised' Kent Districts to provide a guideline cost for kerbside collections. Options with the lowest costs could be accommodated by existing collection rounds. Options with the highest costs required additional vehicles.

(1) Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes, Enviros Consulting Limited et al, March 2004

Indicative costs were assessed for these options. HWRC options with high recycling performed better financially. This is due to the increasing gate fees and landfill tax charges on residual waste.

1.3.9 Employment Opportunities

The increase in long and short term employment opportunities created by the operation of waste management facilities is an important criterion in terms of benefits for the local community and the local economy.

Options that involve increased MRF and transfer station capacity requirements perform well against this criterion in terms of future employment opportunities.

Options that perform poorly are those where materials are to be delivered to less labour-intensive sites for reprocessing, such as composting facilities.

1.3.10 Compatibility with the Waste Hierarchy

The waste hierarchy seeks to promote an integrated approach to waste management. It reflects the fact that the best option for dealing with waste is to reduce the amount created, followed by reuse, recycling and composting, energy recovery and disposal. The aim is to meet statutory targets and ensure better environmental protection by moving up the hierarchy.

Options providing increased tonnages for recycling and composting perform best against this criterion. Option B performs best overall as it aims to increase recycling and composting collections and to increase participation and capture rates.

Options performing least well include Option F, as it results in the lowest increase in tonnages of material recovered for recycling or composting.

1.3.11 End Product Liability

The availability of markets of recyclables and compost can have a considerable impact on the deliverability of each option. As greater quantities of recyclables are collected, the risk associated with finding a market for the material increases. A decline in the price of virgin materials can result in a reduction of the desirability of a product.

Option F performs best overall, as this recovers the smallest tonnage for recycling and composting and therefore poses the least risk in finding an outlet for the product.

Option B performs poorly in this instance, as it carries with it the most risk due to the increased total tonnage of materials recovered for recycling and composting.

1.3.12 Reliability of Delivery

The deliverability of each option relies on the ease at which it can be introduced into the current system and the level of effort required by the householder to recycle these materials.

In this case Option F performs best overall. It requires little change to the current system or levels of participation and can be considered particularly deliverable.

Increasing recycling at bring banks and HWRCs does not perform well against this criterion, as a high level of effort is required from the householder and this is considered to be difficult to encourage.

1.3.13 Accessibility of Services

The collection of a wider range of materials, or broadening the coverage of current recycling services at the kerbside, increases the convenience and accessibility of recycling for householders and will improve the capture rate of materials.

Options that collect a greater range of materials from the doorstep from the greatest number of houses perform the best.

Recycling at HWRCs and bring banks is less convenient and accessible for the average householder than setting materials out at the kerbside, and therefore these options do not perform as well.

Criterion	Option A	Option B	Option C	Option D	Option E	Option F	Option G	Option H	Option I	Option J	Option K	Option L	Option M	Option N	Option O
Depletion of resources (tonnes of crude oil equivalents)															
Score	-1,370,784	-1,954,915	-1,185,431	-1,119,840	-1,113,608	-1,092,690	-1,438,716	-1,264,630	-1,169,487	-1,532,121	-1,151,713	-1,160,974	-1,775,430	-1,235,689	-1,331,218
Rank	(5)	(1)	(9)	(13)	(14)	(15)	(4)	(7)	(10)	(3)	(12)	(11)	(2)	(8)	(6)
Value	0.32	1.00	0.11	0.03	0.02	0.00	0.40	0.20	0.09	0.51	0.07	0.08	0.79	0.17	0.28
Air acidification (tonnes of sulphur dioxide)															
Score	-16,190	-20,137	-14,655	-14,057	-14,025	-13,965	-15,540	-16,128	-14,588	-17,070	-14,442	-14,561	-16,382	-15,300	-16,339
Rank	(5)	(1)	(9)	(13)	(14)	(15)	(7)	(6)	(10)	(2)	(12)	(11)	(3)	(8)	(4)
Value	0.36	1.00	0.11	0.01	0.01	0.00	0.26	0.35	0.10	0.50	0.08	0.10	0.39	0.22	0.38
Greenhouse gas emissions (tonnes of carbon dioxide equivalents)															
Score	-520,039	-1,648,446	-181,071	-262,104	-249,560	258	-492,790	-499,166	-300,000	-770,263	-140,079	-163,411	-734,127	-428,330	-734,544
Rank	(5)	(1)	(12)	(10)	(11)	(15)	(7)	(6)	(9)	(2)	(14)	(13)	(4)	(8)	(3)
Value	0.32	1.00	0.11	0.16	0.15	0.00	0.30	0.30	0.18	0.47	0.09	0.10	0.45	0.26	0.45
Health impacts (tonnes of 1,4-DB equivalents)															
Score	-3.95E+06	-4.88E+06	-2.83E+06	-2.85E+06	-2.84E+06	-2.82E+06	-3.07E+06	-4.17E+06	-3.07E+06	-4.18E+06	-2.84E+06	-2.84E+06	-2.83E+06	-3.39E+06	-3.88E+06
Rank	(4)	(1)	(14)	(9)	(11)	(15)	(8)	(3)	(7)	(2)	(12)	(10)	(13)	(6)	(5)
Value	0.55	1.00	0.00	0.01	0.01	0.00	0.12	0.65	0.12	0.66	0.01	0.01	0.01	0.28	0.51
Energy consumption (TJ)															
Score	-66,265	-96,078	-56,466	-53,784	-53,445	-53,844	-70,625	-60,229	-55,984	-74,856	-55,133	-55,573	-89,426	-58,975	-63,386
Rank	(5)	(1)	(9)	(14)	(15)	(13)	(4)	(7)	(10)	(3)	(12)	(11)	(2)	(8)	(6)
Value	0.30	1.00	0.07	0.01	0.00	0.01	0.40	0.16	0.06	0.50	0.04	0.05	0.84	0.13	0.23
Total road kilometres (te-km)															
Score	25,119,804	39,402,036	24,578,199	27,244,432	27,692,476	22,889,989	26,718,590	24,026,930	25,417,650	27,182,806	22,888,674	22,945,054	29,277,536	24,711,943	26,414,971
Rank	(7)	(15)	(5)	(12)	(13)	(2)	(10)	(4)	(8)	(11)	(1)	(3)	(14)	(6)	(9)
Value	0.86	0.00	0.90	0.74	0.71	1.00	0.77	0.93	0.85	0.74	1.00	1.00	0.61	0.89	0.79
Employment opportunities (annual average no. of total jobs)															
Score	170.9	190.9	173.1	171.2	167.4	174.4	175.7	172.9	165.6	176.6	169.7	170.5	176.3	178.3	187.7
Rank	(11)	(1)	(8)	(10)	(14)	(7)	(6)	(9)	(15)	(4)	(13)	(12)	(5)	(3)	(2)
Value	0.21	1.00	0.29	0.22	0.07	0.35	0.40	0.29	0.00	0.43	0.16	0.19	0.42	0.50	0.87
Compliance with policy (tonnes recycled/composted)															
Score	5,678,143	7,524,064	5,769,961	6,540,896	6,557,616	5,556,108	5,971,665	5,853,094	6,231,093	6,007,841	5,629,606	5,662,620	5,906,283	6,207,209	6,785,577
Rank	(12)	(1)	(11)	(4)	(3)	(15)	(8)	(10)	(5)	(7)	(14)	(13)	(9)	(6)	(2)
Value	0.06	1.00	0.11	0.50	0.51	0.00	0.21	0.15	0.34	0.23	0.04	0.05	0.18	0.33	0.62
Liability of end product (tonnes recycled/composted)															
Score	5,678,143	7,524,064	5,769,961	6,540,896	6,557,616	5,556,108	5,971,665	5,853,094	6,231,093	6,007,841	5,629,606	5,662,620	5,906,283	6,207,209	6,785,577
Rank	(4)	(15)	(5)	(12)	(13)	(1)	(8)	(6)	(11)	(9)	(2)	(3)	(7)	(10)	(14)
Value	0.94	0.00	0.89	0.50	0.49	1.00	0.79	0.85	0.66	0.77	0.96	0.95	0.82	0.67	0.38
Deliverability & Risk															
Score	8.70	10.50	6.80	7.50	7.60	6.60	7.00	6.90	7.20	7.00	10.60	10.70	10.90	11.20	11.80
Rank	(9)	(10)	(2)	(7)	(8)	(1)	(4)	(3)	(6)	(4)	(11)	(12)	(13)	(14)	(15)
Value	0.60	0.25	0.96	0.83	0.81	1.00	0.92	0.94	0.88	0.92	0.23	0.21	0.17	0.12	0.00
Cost Group A (£/ton collected)															
Score	£111.36	-	£116.42	£121.80	-	-	-	-	£113.96	-	£111.17	£111.17	£111.17	£105.24	£100.17
Rank	(6)	-	(8)	(9)	-	-	-	-	(7)	-	(3)	(3)	(3)	(2)	(1)
Value	0.48	-	0.25	0.00	-	-	-	-	0.36	-	0.49	0.49	0.49	0.77	1.00
Cost Group B1 (£/ton collected)															
Score	£130.56	£139.09	£134.56	£144.23	£138.34	£130.56	£130.58	£130.85	£130.54	£130.99	£130.58	£130.58	£130.58	£124.65	£119.58
Rank	(4)	(14)	(12)	(15)	(13)	(4)	(6)	(10)	(3)	(11)	(6)	(6)	(6)	(2)	(1)
Value	0.55	0.21	0.39	0.00	0.24	0.55	0.55	0.54	0.56	0.54	0.55	0.55	0.55	0.79	1.00
Cost Group B2 (£/tonne collected)															
Score	£114.58	£127.81	£131.74	£126.58	£123.85	£114.56	£116.31	£116.31	£114.55	£116.31	£114.57	£114.57	£114.57	£108.64	£103.57
Rank	(8)	(14)	(15)	(13)	(12)	(4)	(9)	(9)	(3)	(9)	(5)	(5)	(5)	(2)	(1)
Value	0.61	0.14	0.00	0.18	0.28	0.61	0.55	0.55	0.61	0.55	0.61	0.61	0.61	0.82	1.00
Cost Group D (£/tonne collected)															
Score	£116.46	£119.32	-	£130.39	£126.55	£116.43	-	£116.41	£126.70	£116.44	116.30	116.30	116.30	110.37	105.30
Rank	(9)	(10)	-	(13)	(11)	(7)	-	(6)	(12)	(8)	(3)	(3)	(3)	(2)	(1)
Value	0.56	0.44	-	0.00	0.15	0.56	-	0.56	0.15	0.56	0.56	0.56	0.56	0.80	1.00

Recycling and Composting Options

Option	Description
Option A	Raise participation and capture rates of current recycling collections to 80%
Option B	Increase coverage of recycling and composting collections to 100% and increase participation and capture to 80%.
Option C	Expand glass collections to all households.
Option D	Introduce compostable kitchen waste collections to all households.
Option E	Expand garden waste collections to all relevant households.
Option F	Expand the current cardboard collections to all households.
Option G	Collect dense and film plastics from 100% of households.
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Option I	Add kitchen and cardboard to current garden waste collections.
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Option N	Increase recycling at the HWRCs to 60%.
Option O	Increase recycling at the HWRCs to 75%.

Key

- Best Performing Option
- Second Best Performing Option
- Next to Worst Performing Option
- Worst Performing Option