

EXECUTIVE – 28 NOVEMBER 2002

WASTE MANAGEMENT STRATEGY

Executive Summary

Waste Management, particularly recycling and disposal, has recently been brought into focus with local campaigns against incinerators and the national debacle over the fridge mountain prompted by increasingly stringent targets for recycling and the avoidance of landfill.

The waste crisis is with us now. Central Government has set, in the context of European Directives, a range of targets, which will require a radical rethink of how the issue of waste is addressed. To achieve these outcomes without the risk of Government intervention requires a holistic approach. The Inspectors Report on the Best Value Review of Waste challenged the Council in respect of Commercial Waste; this proposal incorporates an integrated approach to both municipal and commercial waste.

In the context of the forthcoming Comprehensive Performance Assessment has as one of its main concerns for District and Borough Councils the environmental agenda "clean pleasant and active". The one star unlikely to improve assessment will not help the Council; adoption of this proposed strategy will place it at the forefront of a holistic approach to waste, coupled with its work on environmental maintenance the Council should be able to recover the negative position derived from the Best Value Review of Waste.

The proposed "Zero Waste Strategy" for the Borough incorporates: an active programme of education and information to prevent the creation of waste; complimentary action to minimise the levels of waste with a view to stemming the annual increase; recycling the non organic materials where environmentally it is advantageous and where viable markets exist; recycling the organic material through anaerobic digestion for use as compost; reducing the volume of residual waste through gasification and promoting the re-use of the resultant material in the construction industry; recovering energy where possible through combined heat and power thereby using it in the most environmentally advantageous way.

The key waste processing plant elements considered necessary to enable the delivery of a Zero Waste Strategy for the Borough are:

Material Reclamation Facility

A twin bin collection system is proposed, allowing twin line processing, one line for dry non-recyclables with other dry waste and other line for the organic element. The recyclable materials for which there is a viable market will be diverted separately e.g. paper & card, glass, steel and aluminium etc. A shredding process will be used to reduce the waste size in each line to 100mm after removing the non-organic recyclable element. The organic element will then be sent to a dewaterer to obtain the organic content which is a sludge that will then go to the anaerobic digester. The residual from both lines of processing will be put to energy recovery. Paper and card that cannot be recycled for reprocessing or reuse will be integrated with the organic element to maximise the production of compost.

Anaerobic Digestion

The sludge produced from the dewaterer will be used to produce water and solid inert residue compost that can be used as a soil conditioner. The water will be cleaned and used for irrigation or subject to a discharge licence to top up the Basingstoke Canal. It is estimated that 25% of the output will be soil conditioner/compost and 75% will be water. A by product from this process is a bio gas which can be used to fire a conventional gas fire combined heat and power plant similar to the town centre, Brockhill, Priors Croft CHP plants.

Gasification

It is proposed to put the residual element of the waste into gasification. The proposed gasification plant is to be based on the modular approach as used by the Norwegian company Organic Power (see Appendix 4). The design will work towards a residual element of less than 40% of the waste input, approximately 30,000 tonnes, will be sent to gasification. The assumed outputs are: approximately 25% ash and clinker for which there is a growing market for road construction aggregates; and up to 1,000 tonnes of lime and active carbon to landfill.

Summary

Based on a 77,000 tonne waste input, it is considered that only 1- 8,000 tonnes of the residual waste would need to go to landfill. This addresses the main concern of reducing landfill. The emissions from the plant (combined gasification and anaerobic digestion) will be well within EU 2000 standards. The electrical and heat outputs could serve many homes and businesses and displace further CO₂ emissions. Significant reductions in CO₂ equivalent emissions will be achieved.

The strategy, if fully implemented, could achieve: recycling of non organic and organic materials in the order of 60 to 66%; removal of all Biodegradable Municipal Waste from landfill; reduction of the landfill requirement of all the waste in the Borough to less than 12% of its original weight and possibly as much as to less than 2% coupled with a substantial reduction in volume of any material needing to go to landfill; provision of electrical and thermal energy to homes and businesses in the Borough; substantially reductions of CO₂ equivalent emissions (in the order of 100,000 tonnes) in the Borough through this integrated approach.

It is envisaged that the cost of implementing the full proposal could be in the order of £30M to £50M depending on the scale and extent of the final proposal. Whilst the initial desk exercise envisages that the processing plant can be fully self supporting and privately financed the distribution network for heat and electricity produced by the Combined Heat and Power Plant would probably need to be subsidised, at least in part. Government and European Grants exist for Community Energy systems and Landfill Tax Credits may also be available sources of funding; these will be fully explored if the Council proceeds to the full feasibility study.

The timescale for implementation is envisaged as follows:-

December 2002	Council approves the strategy and authorises the initial consultation
April 2003	Executive & Council consider and approve proceeding to full feasibility study
May 2003	Full feasibility study commenced.
Summer 2003	Detailed analysis of waste from pilot twin bin collections
Autumn 2003	Seek necessary consents
February 2004	Further public consultation on outcomes identified in feasibility study
April 2004	Executive & Council consider results of full feasibility study, including results of further public consultation and agree to proceed
May 2004	Further public consultation outlining the Council's decisions and setting framework for public engagement during the implementation of the strategy
June 2004	Depot relocation and commencement of development of plant and distribution network
June 2004 to March 2006	Construction ongoing, phased implementation, ongoing public engagement.
April 2006	Plant fully operational

The feedback from the research undertaken by the Energy Conservation and Solar Centre (ECSC) on behalf of the Council indicates a positive response from environmental Non Governmental Organisations (NGO's), albeit that the gasification element will attract close attention, mainly because of their underlying objection to creating machines to be fed with waste. The Council's proposal, however, sees the gasification element as the last resort handling some 30% - 40% of the original waste. Whilst NGO's argue that 65% could be recycled, and the Council's proposals will achieve recycling in that order, they do not address the residual element – they have put it in the too difficult box. The Council's modular approach to the gasification element and the design constraints proposed means that waste volumes have to be constrained and the residual element minimised if the Zero Waste Strategy is to be achieved.

It is proposed to take this initiative be taken forward in three stages, first wide governmental, non governmental and public consultation, secondly, depending on the outcome of the first stage, a full feasibility study which will be the subject of a future report and finally a further consultation exercise, subject to the outcome of the feasibility study, on the implementation of the final proposal.

The proposed first stage consultation is intended to be fully open and transparent. There is inherent mistrust of everyone associated with the waste issue – the assumed hidden agenda. The holistic approach taken so far has been welcomed by the NGO's and informal feedback from Government; Local, Regional, National and European has expressed interest in the approach being taken by the Council. Whilst there is a risk of a negative reaction from local environmentalists and residents likely to be near the proposed plant best practice would support a full, open and informed debate on the issue. It will be clear that the consultation exercise seeks to take views into account before making a decision on whether to commission a full feasibility study and install a plant.

Reasons for Decision

To enable the Council to take forward its strategy on waste and to meet its statutory obligations in respect of recycling.

Recommendations

The Executive is requested to

RECOMMEND to the Council that

- i) a Zero Waste Strategy of "an active programme of education and information to prevent the creation of waste; complimentary action to minimise the levels of waste with a view to stemming the annual increase; recycling the non organic materials where environmentally it is advantageous and where viable markets exist; recycling the organic material through anaerobic digestion for use as compost; reducing the volume of residual waste through gasification and promoting the re-use of the resultant material in the construction industry; recovering energy where possible through combined heat and power thereby using it in the most environmentally advantageous way, with a view to reducing the requirement for landfill to less than 15% of its original weight" be approved in the context of the Council's Climate Change Strategy; and
- ii) a "first stage" public consultation exercise be undertaken in respect of the Zero Waste Strategy at an estimated cost of £50,000 to be financed from capital reserves.

This item will need to be dealt with by way of a recommendation to the Council.

Background Papers:

Waste Prevention: (Environment Overview and Scrutiny Committee 4 November 2002).

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1.0 Introduction

- 1.1 Waste is an ever-increasingly contentious environmental issue. Municipal waste collected in England and Wales in 1999/2000 increased by 5.1% from 1998/99 to 29.3 million tonnes. Approximately 400 million tonnes of waste is generated in England and Wales each year. Households produce 20 million tonnes of waste per year in the UK – of this non-governmental organisations argue that 65% is recyclable. The table below shows the composition and proportions of waste disposed of in England and Wales (DETR, 2000):

Type of Waste	Proportion (%)
Municipal	7
Commercial	8
Industrial	12
Construction and Demolition	22
Agriculture	17
Mines and Quarries	19
Sewage sludge and Dredged Spoil	15

- 1.2 Behind the fact that waste is increasing, there are two major issues. The first is that landfill space is fast running out, particularly in Surrey. The majority of waste, whether at the national or local level, is sent to landfill. The second issue is the need to reduce greenhouse gas emissions. A recent report presented by the Royal Commission on Environmental Pollution in June 2000, whilst recognising the efforts made by the UK Government (a reduction target in CO₂ emissions of 20% from the 1990 level by 2010), suggested that it was necessary to reduce greenhouse gas emissions by 60% by 2050 and 80% by 2100.
- 1.3 With these statistics and information showing the growth of waste alongside the need to reduce landfill and greenhouse gases, the issue of managing waste has gained a very high profile globally, nationally and locally.
- 1.4 The idea of sustainable management of waste is key to this. Sustainable waste management principles include the need to reduce the amount of waste produced, to make the best use of the waste that society produces, to minimise the risks of immediate and future environmental pollution and harm to human health, and finally to increase the proportion of waste managed by options towards the top of the 'waste hierarchy'.
- 1.5 The existing waste hierarchy, driven by the need to plan for limited landfill space is obviously relevant to this issue. It is better not to manufacture, transport and then discard items if at all possible. Items should be reused to prolong their life and so make better use of the carbon that was invested in its production and distribution. Failing this, recycling of materials, although involving greater energy use in transport and processing still saves carbon involved in the use of virgin materials. Finally, for the unrecyclable waste that is left, disposal locally saves transport carbon, avoidance of biodegradable waste in landfill reduces methane emissions and recovery of energy displaces fossil carbon use.

1.6 This hierarchical ladder of waste management practices is composed of seven factors decreasing in favour:

1. Reduce overall consumption;
2. Consume selectively – aim for maximum possible use of secondary materials, durability, reparability and recyclability. Buy second hand, hire or share;
3. Minimise the generation of waste;
4. Re-use;
5. Recycle (including composting);
6. Recover energy;
7. Dispose to properly engineered landfill only as a last resort.

1.7 The ideas of varying importance of different waste management strategies are reflected in directives which essentially shape integrated waste management, addressing waste minimisation and optimising recycling, composting and energy recovery, globally, nationally and locally.

1.8 The EU Landfill Directive provides an overarching strategy transcending into national, regional and local waste management principles. It was implemented to ensure that landfill sites across the EU face strict regulatory controls on their operation, environmental monitoring and long-term care after closure. Its main objective is to reduce the emission of methane from landfill sites.

“...measures should be taken to reduce the proportion of methane gas from landfill sites in order to reduce global warming, through the reduction of the landfill of biodegradable waste and the requirements to introduce the landfill gas control” (EC, 1999)

1.9 The Directive sets targets for the reduction of bio-degradable municipal waste (BMW) being sent to landfill for final disposal:

- by 2010 to reduce BMW going to landfill to 75% of 1995 level
- by 2013 to reduce BMW going to landfill to 50% of 1995 level
- by 2020 to reduce BMW going to landfill to 35% of 1995 level

1.10 One of the key reasons it has proved difficult to move away from dependence on landfill, is that on average landfill is still by far the cheapest form of waste management for much controlled waste. Consequently, the majority of controlled waste in the UK goes to landfill sites. The UK waste policy is generally targeted at changing that. The organic portion of the waste degrades within a landfill site to produce landfill gas, which is composed of approximately half methane and half carbon dioxide. Methane is of particular concern because it is 21 times as powerful a greenhouse gas as carbon dioxide. Thus, landfill sites contribute significantly to UK greenhouse gas emissions through their methane emissions. Currently methane emissions from landfill sites make up approximately 3% of UK greenhouse gas emissions.

1.11 Examples of how waste management is addressed at the national level:

- Landfill Tax: was introduced in October 1996. Designed to impose the 'polluter pays' principle. Standard rate is set at £10 per tonne of waste sent for landfill.
- Waste Strategy 2000: sets challenging targets for better waste management e.g. to recover value from 45% of municipal waste by 2010, at least 30% through recycling or composting.

1.12 Local authorities have a very important role to play in sustainable waste management. In the UK, there are a wealth of legislative/statutory targets that have been published for all tiers of local government to work towards. The targets that are pertinent to this Council are as follows:

- To achieve a recycling rate of 26% by 2003/4;
- To achieve a recycling rate of 36% by 2005/6.

1.13 Also at the local level, the Best Value regime seeks to ensure that all services are delivered in the best, most cost effective way. The Woking Best Value Review of waste management (refuse collection and street cleaning) concluded that Woking has a 'fair' waste management service. Under the current waste management practices, it was concluded that the service which was 'unlikely to improve'. In the context of the forthcoming Comprehensive Performance Assessment the current work on both environmental maintenance and waste strategy and collection are essential if the Council is to avoid a poor score on environmental matters.

1.14 Government guidance states that in developing their community strategies, local authorities and their partners should have regard for the Government's sustainable development strategy. The guidance also states that community strategies should also take into account the ways in which national and global concerns – such as waste management – can be addressed through local action.

1.15 The Council has already demonstrated its commitment to sustainable development, through its support of the 18 themes of a sustainable Woking. The first two themes aim to minimise resource use and waste and minimise pollution.

1.16 The Local Strategic Partnership (LSP) has developed a Community Strategy for Woking in partnership with the community. Six key themes emerged, one of which was a clean, healthy and safe environment. All Council services and actions should contribute to delivering these themes. However, the ways in which the waste management strategy could contribute to this theme of the Community Strategy include:

- Reducing landfill in turn reduces methane emissions into the atmosphere, thus ensuring a safer environment.
- Integrated waste management will ensure a cleaner community.
- If everyone is aware of a local waste management strategy in which they can participate, there will be a stronger sense of community.
- Waste will be minimised and its value as a resource optimised within the Borough, optimising the cleanliness of the Borough.

1.17 The Climate Change Strategy considered earlier in the agenda seeks to set a framework within which the Council can build on its best practice and innovation in energy services and apply this innovation to an holistic and sustainable approach to waste. A 'Zero Waste' approach is proposed. This approach is consistent with a key environmental objective within the Council's Community Strategy which is to "Develop an integrated strategy to minimise waste, increase recycling and reduce the impact of landfill." The Council has the power to do this by virtue of the power of well-being within the Local Government Act 2000 in addition to its statutory duties in respect of waste collection and recycling.

1.18 This approach aims to provide a framework for dealing with all of Woking's waste paying due regard to the longer term and not merely seeking to achieve short term targets. To ensure that the strategy contributes to the wider Community Strategy and is beneficial to the Borough, It is therefore the intention that the proposed solution should ensure that:

- The collection method enables all households to participate;
- The number of collection vehicles and therefore vehicle movements is optimised;
- The treatment of waste and handling of recyclable materials is locally accessible to ensure that waste produced in the borough can be treated or recycled within the borough;
- That the final treatment and disposal method recovers the optimum value for the benefit of the Council's community e.g. the sale of recyclable materials to off-set collection costs; or Combined Heat and Power (CHP).

1.19 Under the UK Climate Change Programme, the Government's target is to increase CHP from 5,000 Mwe to at least 10,000 Mwe by 2010. Energy recovery from waste will reduce emissions of methane gas and CO₂ from landfills. Since methane has 21 times the heat trapping capacity of CO₂, methane is a serious contributor to the greenhouse effect.

1.20 It should be noted that there are social and environmental benefits of energy recovery:

- Thermal conversion of waste reduces need for landfill space;
- Decentralised solutions reduce transport of fuel and energy;
- Can serve as profitable and regularly maintained basic power supply system for public buildings, factories and hospitals, etc;
- Replaces fossil fuels (mitigates greenhouse effect and counts towards CO₂ credits).

1.21 This report sets out an analysis of the types of waste that residents of the Borough produce, an analysis of treatment methods and their environmental benefits and recommends a sustainable solution for dealing with waste in the Borough of Woking.

1.22 A separate report later in the agenda addresses the approach to collection of waste. Collection, recycling and disposal are inextricably linked, however, for the purpose of the strategy outlined in this report it is assumed that a suitable collection methodology is introduced as outlined in the Waste Collection report.

2.0 Analysis of the composition of household waste

2.1 Before determining the most appropriate best practicable environmental option for the recycling/composing treatment and final disposal of waste, it is important to understand what the waste comprises.

- 2.2 Appendix I sets out tabulated details of the waste composition for Woking based on values used by the former DETR in preparing the Waste Strategy 2000.
- 2.3 In total it is estimated that Woking produces some 77,000 tonnes of waste of which some 53,000 tonnes is biodegradable and some 11,000 tonnes is non organic recyclables. Of these totals some 30,000 tonnes of household waste is produced of which some 21,000 is biodegradable and some 6,000 tonnes is non organic recyclables.
- 2.4 Woking's compositional data reflects the low level of industrial and mineral production in the Borough. The high level of paper and card reflect the prevalence of office based business in and around Woking.

3.0 Waste Management Measures

- 3.1 Appendix 2 sets out a range of waste management measures that the Council can pursue in taking forward its Waste Management Strategy.
- 3.2 The proposed Zero Waste Strategy for Woking will embrace the waste hierarchy and promoted reduction of consumption, selective consumption, minimise the generation of waste through waste prevention and reduction initiatives, encourage re-use, recycle non organic and organic elements of the waste stream, recover energy from the residual waste, minimise the amount needing to go to landfill.

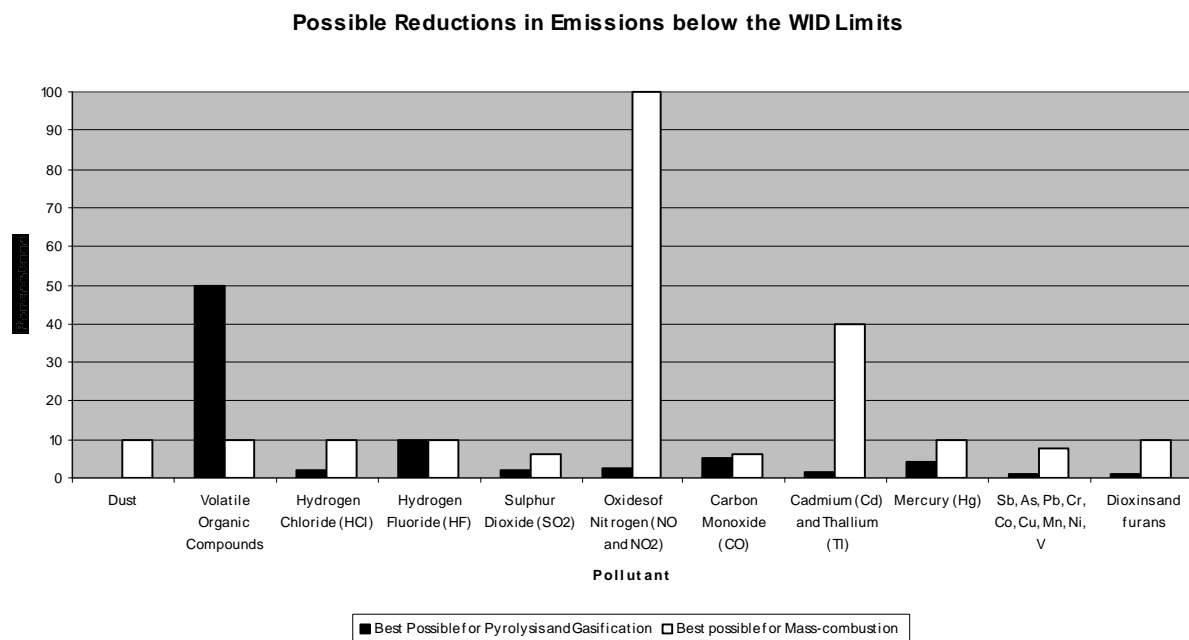
4.0 Environmental Assessment of Disposal Techniques

- 4.1 The environmental assessment of possible disposal or volume reduction techniques has to be seen in the context of how EU regulation through directives is driving improvements in the environmental performance of both landfill and thermal treatments. Thermal treatments will require Integrated Pollution Prevention and Control (IPPC) consent from the Environment Agency (EA). This process (deriving from EU Directive 96/61/EC) assesses each site to determine if Best Available Technique (BAT) standards are being met. The EA has published a draft version of its guidance on how it will assess BAT for thermal treatments of waste, this looks at all aspects of any facilities' environmental performance and sets benchmarks for these aspects which it would expect, under most circumstances, to be met in any IPPC consent. The EU expects to issue its BAT reference document (BREF) for waste incineration in 2003. This document will be the result of the exchange of information between the member states about what should be taken into account when determining BAT. The EA guidance will be revised to take account of the BREF when it appears. BAT must be a technique that is affordable without making an industry sector uncompetitive on a European basis.
- 4.2 Parallel to the IPPC directive and process, which applies to all processes requiring emissions consent, there is the Waste Incineration Directive (WID) – directive 2000/76/EC. This applies to incineration, combustion of RDF, and pyrolysis, gasification or plasma processes 'in so far as the substance resulting from the treatment are substantially incinerated'. Implementation for new plants is to be by 28 December 2002. The emission standards to air and water set out in the directive are binding and so the EA will not be allowed to issue IPPC consents in excess of these limits, they may however require more stringent limits where the BAT for that site can deliver them.

4.3 Landfill is also subject to IPPC, and has its own directive – the Landfill Directive (1999/31/EC). This Directive prohibits certain hazardous wastes from landfill, will make pre-treatment of waste a requirement and sets limits on the amount of biodegradable municipal waste sent to landfill. It also tightens operational and engineering standards for landfill operators.

Emissions

4.4 The maximum allowed emissions to air are set out in Annex V of the WID, and are summarised in the graph below. It should be noted that the 100% line represents the acceptable EA limits of emissions for different processes.



4.5 The main points from the above graph are:

- Well-run incinerators can operate within these levels;
- Pyrolysis/gasification plants are relatively new and published data is limited;
- The areas in which pyrolysis/gasification do significantly out-perform incineration are heavy metals and (potentially) dioxins where no safe limit for health has been established;
- Emissions from pyrolysis/gasification vary according to whether a boiler/steam turbine, a gas engine or a gas turbine is used.

Size of plant

- 4.6 An incinerator plant is usually massive. Most require structures of some 30 metres in height with flues ranging from 60 metres to 90 metres. The plant cannot be missed. Pyrolysis and Gasification plants are smaller. Most require structures up to 15 metres in height and flues ranging between 18 metres and 30 metres depending on location. These plants are similar to other properties in typical commercial estates, they can even be located in countryside locations with appropriate landscaping. Anaerobic digestion plants require similar industrial/commercial locations but are generally smaller buildings which can be sited in agricultural locations. Such plants are used on the continent to process farm waste and thereby minimise pollution of water courses, an issue yet to be properly addressed in the UK.
- 4.7 The size of a waste facility is principally determined by the daily tonnage the plant is designed to handle. However, manufacturers of pyrolysis and gasification plants point to reduced chimney stack size because the burning of the fuel gas does not require a large stack for flue-cleaning equipment. One manufacturer claims a reduction in length of building from 130m to 100m, a reduction in height from 40m to 21m and a reduction in stack height from 90m to 27m, all for two equivalent, substantial plants (300t/day).
- 4.8 Any solution for Woking would need to be properly assessed. Based on the estimated maximum of 77,000 tonnes a building of up to 15 metres high by some 100 metres long and 30-50 metres wide with a maximum flue height of 30 metres (similar to Town Centre CHP Station) is anticipated, subject to a detailed feasibility study.
- 5.0 **An Environmental Review of alternative types of treatments for each waste stream**
- 5.1 The table below shows the most environmentally acceptable option of treating and disposing of waste based on several key factors as follows: air pollution; water pollution; land pollution; transport impact; climate change factor. The higher the score on the assessment, the more environmentally acceptable the methodology.

Table of comparative environmental performance

Technology	Weighted Environmental Index
Landfill	4.5
Landfill with energy recovery	5.0
Mass combustion	5.0
Fluid bed combustion	5.3
Mass combustion with CHP	5.7
Fluid bed combustion with CHP	5.9
Pyrolysis / Gasification	6.6
Pyrolysis / Gasification with CHP	7.2
Anaerobic Digestion	8.1

- 5.2 In order to design the best practicable option for a sustainable management solution for Woking's waste, it is necessary to consider the waste streams that can be tackled. The main waste streams are usually described as follows: mixed general household waste; mixed general commercial waste; mixed dry recyclables and mixed biodegradable waste. On the basis that a stable market place exists to receive and to process the recyclables, it is possible to separate out those selected materials in a MRF at the start of the treatment process. An example would be the separation of cans from newspapers and magazines and plastics. These elements once separated can then be baled up and sold into the relevant market. This would leave residual material in the form of putrescible organic waste to be dealt with. It is possible to treat this waste material by either anaerobic digestion to recycle the waste into compost; or gasification which produces a clinker which could be used in construction and to produce a biogas for use with CHP. However, there are other factors to consider such as site location and size.
- 5.3 From the table above it is clear that anaerobic digestion is the most environmentally friendly treatment type. This should feature highly in any strategy and will enable maximum recycling of organic material. As for residual waste, pyrolysis or gasification with CHP offers the least harmful technology for the reduction or disposal of residual waste.
- 6.0 **Woking's Proposals for a New Waste Management Strategy**
- 6.1 Woking produces some 77,000 tonnes of waste each year including some 2,000 tonnes of construction waste, see Woking Waste, table 5 in Appendix 1. At present most of this is landfilled. Increasingly, landfill will become a more and more difficult option. The Landfill Directive sets a binding target of 65% reduction (against 1995 levels) in biodegradable waste going to landfill by 2020.
- 6.2 As well as the facts that highlight the severity of the waste issue, the introduction of the Landfill Directive has meant that alternative solutions must be found sooner. The Directive presents a greater opportunity to reduce landfill, while also exploring waste minimisation strategies and other alternative waste management methodologies.
- 6.3 In this way, this report's aim is to highlight how Woking is taking on board the facts about the increasing urgency to deal with waste and how it is proposing to utilize all the background information as discussed and formulate an integrated and holistic waste management strategy, one which addresses waste prevention and reduction, optimises recycling and integrates energy recovery with combined heat and power.
- 6.4 The proposed strategy has the benefit of addressing the issue of reducing CO₂ equivalent emissions, as addressed by the Climate Change Strategy for Woking. Processing Woking's waste via anaerobic digestion and thermal treatments will produce CO₂ but less than the methane equivalent as emitted from biodegradable waste committed to landfill. It is provisionally estimated that if Woking's waste was diverted from landfill it could have the equivalent reduction of some 100,000 tonnes of CO₂ equivalent emissions, however, this will need to be assessed during the detailed feasibility study if the Council proceeds with the strategy.
- 6.5 It is proposed to use a combination of established technologies to achieve an integrated waste management strategy, i.e. waste prevention and reduction educational programmes, material reclamation facilities, anaerobic digestion, gasification and combined heat and power. It is proposed to adopt an "island Woking" approach to Woking's waste management whereby no waste will be imported or exported, therefore the strategy will be solely dealing with the community's waste. A Zero Waste Strategy.

- 6.6 There are three partners proposed to take this strategy forward with the Council: Thamesway Ltd –the Council’s wholly owned Energy and Environmental Services Company, Hedeselskabet – a private Danish company with member association, a partner in the Council’s joint venture Thamesway Energy Limited, currently operating anaerobic digestion plant in Denmark; and Organic Power, a Norwegian company currently operating gasification plant.
- 6.7 It is proposed to construct a waste processing plant with CHP facilities at the site of the Monument Way depot. Three satellite CHP stations are also proposed in the Sheerwater/Maybury ward at Bishop David Brown School, Monument Hill School and Wesco Court. All subject to necessary agreements and approvals
- 6.8 For details on the proposals for a new waste management strategy, see Appendix 4.
- 6.9 In the context of the Council’s statutory duty to achieve its recycling target, consideration needs to be given to the best available technology to achieve recycling at least equivalent to the current targets and preferably closer to the levels agreed as possible by non governmental organisations.
- 6.10 To achieve anything in the way of improvement, revised collection methods will be required. Separation at source through kerbside collections is the only viable method of improving performance. A report on collection methodology is later in the Agenda. The remainder of this report will assume that revised kerbside collection is introduced.
- 6.11 Assuming the revised collection methodology enables the organic element to be collected separately from the non organic recyclables, the following approach, which is advocated by the Council’s Company, Thamesway Ltd, is recommended. The development of a waste processing plant, dealing solely with household waste, including the following components is estimated to achieve recycling levels in excess of 60% and avoidance of landfill between 88% and 98%. The components are:-
- | | | |
|---------------------------------|---|--|
| Material Reclamation Facilities | - | capacity to process dry recyclables and residual dry waste (10,000 tonnes) and organic element (20,000 tonnes) separately and capable of recovering up to 5,000 tonnes of non organic recyclable material. |
| Anaerobic Digestic | - | capacity to process up to 15,000 tonnes of organic waste. |
| Gasification Plant | - | capacity to process up to 10,000 tonnes of residual waste. |
| CHP Plant | - | capable of processing biogas from Anaerobic Digester and Gasification Plant. |
- 6.12 This approach would enable the Council to process all of its Municipal Solid Waste, up to 30,000 tonnes per annum. It is estimated that this processing plant could enable the Council to achieve recycling sites in excess of 66% and reduce the residual element of waste to be transported to landfill to some 2-10% of its original weight. The plant would also produce electricity and heat which could be supplied to neighbouring properties.
- 6.13 These operations are wholly consistent with the Council’s statutory obligation to collect domestic refuse, achieve recycling targets and promote combined heat and power in the context of its Home Energy Conservation Act targets.

6.14 It would also be possible for the Council to take a more progressive approach and seek to address commercial waste arising in the Borough. In the context of Climate Change this would maximise the reduction in CO₂ equivalent emissions but would necessitate a larger plant. If all waste in the Borough was to be processed in this way, to achieve a Zero Waste strategy, the capacity of the plant would need to be increased to:-

Material, Reclamation Facility	-	would need to process up to 75,000 tonnes of waste (2,000 tonnes of construction waste would not be accepted for processing) and be capable of recovering 10,000 tonnes of non organic recyclable material.
Anaerobic Digesters	-	capacity of up to 37,000 tonnes.
Gasification Plant	-	capacity of up to 28,000 tonnes
CHP Plant	-	capable of processing biogas from Anaerobic Digester and Gasification Plant.

6.15 These sizings are illustrative. To assess the scale of plant required and the exact proportions achievable (balance between Anaerobic Digester and Gasification Plant) it will be necessary to undertake a full feasibility study. It is not proposed to incur such expense at this stage as a full study could cost between £250,000 and £500,000 although this can be done in a series of stages limiting any financial exposure.

6.16 It is proposed, in the first instance, to undertake public consultation of the environmental credentials of the Thameswey Ltd proposal. A desk study has already been undertaken upon the Council's and Thameswey's behalf by the Energy Conservation and Solar Centre (ECSC), a copy of the report is attached at Appendix 5. In essence the ECSC report indicates that whilst there will be some concerns expressed by the NGO's, the Council's proactive stance is seen as an opportunity to explore in public the proposal as a Best Practical Environment Option. It therefore proposes that the Council publish its proposals and engage in a facilitated public debate. ECSC has indicated its willingness to continue to act as an independent facilitator. This will enable a number of focus groups to be held and the debate to be undertaken in an informed manner, this should enable the production of a suitable questionnaire for the Citizen's Panel should the Council wish to seek wider public opinion. In addition publicity material will be required to explain the Council's intentions to a wide range of stakeholders.

6.17 An outline of the publicity and consultation programme is attached at Appendix 6. The programme is estimated to cost £50,000 and will take three months to complete. The related programmes for the Climate Change Strategy and the Waste Collection proposals are also included.

7.0 Conclusion

7.1 The proposed strategy is designed to tackle Woking's waste in an integrated and environmentally beneficial way, while tackling the three main areas of waste management: reduction, recycling and recovery.

7.2 It also addresses the main concerns of the Council in terms of dealing with waste:

- It will promote the prevention and minimisation of waste;
- It will maximise recycling and anaerobic composting of organic waste;
- It will maximise the avoidance of landfill;
- It will contribute to reductions in CO₂ equivalent emissions.

7.3 In taking forward the proposal, several factors need to be considered:

- Early discussions are needed with Surrey County Council. It needs to be established where the plans for Woking's proposed waste management strategy fit into Surrey waste management contracts. It is understood that the proposal is compatible but this will need to be verified in detailed discussions;
- Early discussions with Government agencies, Government Office for the South East, (GOSE), South East England Regional Assembly (SEERA), South East England Development Agency (SEEDA), Office of the Deputy Prime Minister (ODPM), Environment Agency etc.
- Continuing discussions with environmental groups are necessary. ECSC has already obtained an insight into the position held by such groups on proposals for waste management such as Woking's;
- Early Public consultation. Transparency in plans is necessary to gain public confidence in the proposals. This is an area which incur cynicism and controversy. However, it is believed from the feedback from the NGO's that Woking's proposals will bring about environmentally beneficial waste management and this needs to be conveyed to the public, albeit that the gasification element of the proposal will need to be carefully handled.
- A pilot of the twin wheeled bin method of collection with an alternate weekly collection of separated materials for a period of 6 months (see Waste Collection Report);
- A detailed appraisal of the plans is necessary;
- The issue of the relocation of depot users from the proposed site at Monument Way would need to be addressed.
- Full support of the proposal by the Council will be needed in taking the proposals forward.

8.0 Implications

Financial

8.1 The cost of implementing the full proposal has not been assessed in detail although it is likely to be in the order of £30M to £50M subject to the detail and extent of the final solution. A desk exercise has established that it should be capable of being privately financed provided some financial support is available for the electrical and heat distribution arrangements. Government and European Grants are understood to be available for community energy schemes and this avenue will be pursued if the scheme progresses to full feasibility stage. In addition Landfill Tax Credits may also be available. The full appraisal will be needed in due course, but it is not envisaged that the financial burden of implementing the processing proposal would fall on Woking Borough Council taxpayers although taking the initiative forward to the point of deciding whether or not to develop the proposal will need to be financed by the Council.

- 8.2 Initially it is proposed to test the environmental merits of the proposal through a full public consultation exercise estimated to cost £50,000. This cost can be financed from capital reserves.
- 8.3 This estimate incorporates

	£
Design and Publication of promotional information, press briefings and response to enquiries for information. This service will be bought in from the Council's existing contractor, Revelations.	15,000
Facilitated briefings and/or discussions with focus groups, peers in Central and Local Government and other relevant bodies. This service will be bought in from the Council's existing independent environmental consultant, ECSC.	15,000
Citizen's Panel consultation undertaken by one of the Council's existing partners supporting the administration of the Citizen's Panel.	10,000
Provision for miscellaneous and unforeseen items.	<u>10,000</u>
	<u>£50,000</u>

Human Resource/Training and Development

- 8.4 Additional human resources will be required to undertake the initial public consultation. These have been taken into account in assessing the cost of the public consultation exercise through the use of Revelations, ECSC and existing partners supporting the Citizens Panel.
- 8.5 Existing staff resources will also need to be deployed in supporting the consultation exercise. It is difficult to estimate the level of demand this will place on officers, it is however envisaged that significant senior management time will need to be allocated to this activity during the consultation period, equivalent to one day per week of one member of Management Team over the three month consultation period prior to reporting back to the Executive in April 2003.

Environmental/Sustainability

- 8.6 Environment is an important area for the forthcoming Comprehensive Performance assessment. The earlier Best Value Review of Waste "one start and unlikely to improve" puts the Council in a weak position. The proposed Zero Waste Strategy together with revised environmental maintenance arrangements will, however, place the Council in a strong position.
- 8.7 The proposal envisages a significant improvement in the environmental conditions in the Borough and makes a contribution to the Government's Climate Change and Landfill Directive objectives. If implemented, the project would make a significant contribution to the Council's own Climate Change Strategy.

- 8.8 Whilst the desk exercises show the potential for very significant reductions in residual waste to landfill (between 2% and 12% of its original weight) it is proposed, for the purpose of the strategy to set a target of reducing the requirement for landfill to 15% of its original weight; this is considered realistic.
- 8.9 The issue of emissions from the combustion of the gas generated by the Gasification Plant will be of environmental concern more through perception than reality as the emissions from the CHP Plant using the gas is well controlled and is likely to be less harmful than local bonfires, industrial boiler plant and even some household gas appliances. Nonetheless it is proposed to explore an alternative to combustion of the gas. The alternative, which is understood to be operational in Germany, is to pass the gas directly to a Fuel Cell. This would avoid any combustion and therefore, if viable, would avoid any flue emissions; the by- product of the Fuel Cell process is high quality water.

9.0 Consultations

- 9.1 ECSC has undertaken a wider range of informed discussions with Non Governmental Organisations. LA21 have been consulted in the context of Climate Change but not in detail on the contents of this report. Informal discussions have been held with colleagues at Surrey County Council (SCC) to alert them to the Council's consideration of this matter and to ensure that raising this issue was not incompatible with SCC's current policy objectives. Informal discussions have been held with officers of SEERA during the drafting of its strategy for Energy Efficiency and Renewable Energy. If the Council decides to progress the initiative SEERA officers have indicated they would welcome the opportunity to discuss the proposals both at officer and member level.
- 9.2 These consultations indicate that the Non Governmental Organisations and Government Organisations welcome Woking's holistic approach and look forward to discussing them in more detail and openly in the public domain.

REPORT ENDS

EX0472.DOC

Analysis of the composition of household waste

1. The waste composition for Woking is shown in Table 2 and is based on the values used by the former DETR in preparing the Waste Strategy 2000 shown in Table 1.

Table 1: Household Waste Percentage Composition

	National Estimate 2000 (%)	National Survey 1992 (NHWAP) (%)	Hampshire 1999 Survey (%)	Waverley 1994 (%)	Wealden 1999 survey (%)
Paper and Card	23.1	33.2	32.5	33.5	17.5
Plastic	9.5	11.2	12.7	9.2	8.4
Textiles	3.0	2.1	4.6	1.0	0.5
Misc.	9.2	9.9	6.3	9.7	11.3
Glass	6.1	9.3	4.2	8.6	5.6
Metals	4.7	7.3	5.0	5.8	0.2
Putrescibles	44.1	20.2	30.3	21.8	53.0
Fines	0.3	6.8	4.3	10.4	0.5

Table 2: Estimated tonnage of materials in household waste in Woking

Material	Tonnage per Year (estimated)	Proportion of the Waste Stream
Paper and Card	6,930	23.1%
Plastic	2,850	9.5%
Textiles	900	3.0%
Misc.	2,760	9.2%
Glass	1,830	6.1%
Metals	1,410	4.7%
Putrescibles	13,230	44.1%
Fines	90	0.3%
Total	30,000	100%

2. Although this report is concentrating on the household waste stream it is helpful to know and to understand the composition of the commercial and industrial waste streams, particularly when preparing a business case in developing a sustainable solution to Woking's waste.

3. A report was produced by MEL research on behalf of SCC in 1999 entitled 'Quantities and Composition of Industrial and Commercial Waste Generated in Surrey'. Data from this report has been used to prepare Table 3.

Table 3: Arisings, Volumes and Composition of Commercial and Industrial Wastes in Woking (1999)

Waste Type	Estimated tonnage per annum in Woking	Volume of Waste (cubic metres)	Percentage composition
Paper and Cardboard	22,928	38,213	48.8
Animal Matter (inc mixed animal and vegetable)	5,523	7,364	11.8
Vegetable Matter and Wood	3,419	4,884	7.3
Plastic	2,718	3,397	5.8
Metal	2,391	1,594	5.1
Mixed General	2,335	11,675	5.0
Construction and Demolition	1,900	1,583	4.0
Packaging	722	1,031	1.5
Other	5,064	25,320	10.8
Total	47,000	95,061	100.0

4. The survey also found that in Surrey, 15% of waste is from industry and 85% from commerce including public services. Of this, 71% was collected by private sector contractors and 20% of the material taken directly to treatment and disposal sites. Only 7% was collected by local authority services. The data in table 3 includes both separated waste streams and estimates of the composition of the general mixed waste stream. Volume estimates have been made by using Environment Agency conversion factors. Table 4 below, contains national commercial and industrial waste data and has been taken from the Waste Strategy 2000 (DETR, 1999).

Table 4: National Commercial and Industrial Waste Arisings and Composition

Waste Type	Estimated annual generation (million tonnes)	National percentage composition	Woking Estimated %
Inert and Construction	2	2.6	4.0
Paper and Card	7	9.0	48.8
Food	3	3.9	11.8
Other general and biodegradable	9	11.5	7.3
Metals and scrap equipment	6	7.7	5.1
Contaminated and Healthcare	5	6.4	Not identified
Mineral waste	6	7.7	N/a
Chemicals	4	5.1	Not identified
General Commercial	23	29.5	19.5
General Industrial	13	16.7	3.4

For the purpose of developing this strategy the following waste assumptions have been made based on the foregoing data.

Table 5 - Woking's Waste

	Household		Commercial		Total	
	Tonnes	%	Tonnes	%	Tonnes	%
Biodegradable						
Paper & Card	6,930	23.1	22,928	48.8	29,858	38.8
Putrescibles	13,230	44.1	8,942	19.0	22,172	28.8
Textiles	900	3.0			900	1.2
Non Organic Recyclable						
Plastic	2,850	9.5	2,718	5.8	5,568	7.2
Metal	1,410	4.7	2,391	5.1	3,801	4.9
Glass	1,830	6.1			1,830	2.4
Other						
Construction & Demolition			1,900	4.0	1,900	2.5
Other	2,850	9.5	8,121	17.3	10,971	14.2
Totals	30,000		47,000		77,000	
Totals Analysis						
Biodegradable	21,060	70.2	31,870	67.8	52,930	68.7
Non Organic Recyclable	6,090	20.3	5,109	10.9	11,199	14.5
Other	2,850	9.5	10,021	21.3	12,871	16.7

Waste Management Measures

1. The introduction to this report has highlighted how waste is a growing issue. The following sections of the report aim to provide an insight to some solutions to waste management, and later how these may come into force as part of Woking Borough Council's waste management strategy. This section of the report focuses in on the three Rs of waste management: reduction, recycling and recovery (i.e. energy from waste). It is aimed to provide an explanation of how each of these areas work and then how they are proposed to be incorporated into the Council's proposals.

Reduction

2. Waste prevention is a key to the reduction of waste. While the rest of this section discusses waste minimisation as a way of reducing the quantity of waste entering the waste stream, waste prevention looks at measures of preventing unnecessary waste entering the waste stream. A report on Waste Prevention was presented to the Environmental Overview and Scrutiny Committee on 4th November 2002, the Committee endorsed the recommendations of the task force and in taking these initiatives forward focus will be given to waste prevention.
3. Waste minimisation has tended in the past to focus on reduction of waste once collected through recycling and re-use so as to minimise the waste for disposal. Whilst maintaining efforts in this regard higher priority will be given to promoting waste prevention with a view to reversing or stemming the trend of increased waste volumes.
4. Waste generation has become an accepted consequence of economic growth, waste prevention and minimisation needs to try to break the link between economic growth and waste which lies behind the current and future growth of municipal waste.
5. The proposed waste strategy will place waste prevention, minimisation and reduction at its heart as it is essential to an integrated approach towards waste management.
6. It will be difficult to stem the annual rise in waste generation, it is a hearts and minds thing. What is at first necessary is more education and information on how people contribute to the waste problem and how they can help reduce it by changing their behaviour.
7. If reference is made back to the waste management hierarchy (paragraph 1.6), waste prevention and reduction initiatives were highlighted as the top four preferred options in tackling waste. There is currently more focus on the bottom rungs of this hierarchical ladder of waste management – we will need to turn this thinking and approach on its head. Education is key and we will need to do this in partnership with the Waste Disposal Authority.
8. There are four main components of reduction as a tool for waste management, which will be described in turn below:
 - Reduce overall consumption;
 - Consume selectively;
 - Minimisation;
 - Re-use.

Reduce overall consumption

9. The primary aim of waste prevention and reduction should be to reduce the generation of waste at source.
10. This aspect of waste prevention and reduction comes down to having to change people's way of thinking in respect to waste. This is difficult to change as it is engrained in society, especially within an affluent, consumerist society. The reduction of the overall consumption of waste regards a fairly obvious and simple message and brings into question the need to acquire waste and how to avoid it. Essentially, this type of initiative endeavours to reduce stocks and wastage of materials. For instance, Sainsbury has attempted schemes to reduce the number of carrier bags issued at checkouts. Actions such as bulk purchasing to avoid so much packaging seem obvious in theory but behind these initiatives, we need educational programmes and a gradual changing of values in respect to consumption and waste.
11. Businesses should increasingly consider waste reduction options from the design of a product, through its manufacturing process, to the way it is transported, packaged and sold. There needs to be an active decision from consumers to buy goods designed for re-usability and materials recovery potential. Consumers are key – without their input, businesses are unlikely to pursue waste reduction strategies. The cost and resource saving opportunities for companies who consider waste reduction when producing, transporting and selling their goods are significant.

Selective consumption

12. Promoting more selective consumption is another option within the broad category of waste prevention and reduction. As demand in products grows, as does consumption and through this, waste prevention and reduction issues could be addressed. Consumer purchasing power can be influential forces, through these, people should be encouraged to:
 - Increase the use of secondary materials;
 - Decrease the use of primary materials;
 - Purchase more durable, longer life products;
 - Purchase repairable products;
 - Purchase recyclable products.
13. Again, this relates very much to people's habits and opinions towards waste and essentially a change in behaviour is necessary; this can only be achieved through education and information.

Minimise waste generation

14. The most basic approach to waste prevention and reduction is obviously the minimisation of waste generation in the first instance. However, this area lacks attention. Although waste handling costs are rising, and as such waste minimisation would prove to be a simple way of making savings, this approach has not been fully addressed. This would provide economic and environmental benefits. An example of waste minimisation is how a large business can pressurise their suppliers to reduce packaging and in turn reduce their waste. The domestic consumer has less buying power and not enough information and choice on packaging at the point of sale to enable them to make purchases which will minimise their waste. Again this initiative is difficult to achieve without first educating people about waste issues and changing their habits. A way of measuring waste minimisation is by carrying out a waste audit of the contents of waste to provide a baseline indicator against which future minimisation efforts can be measured.

Re-use

15. Once again our consumerist and affluent society results in many products ending up in the waste stream before they have ceased to function effectively. This again relates to people's way of thinking and behaviour. A very small proportion of products goes through charity shops or second hand trading. Essentially, this relates to the difficult task of changing consumer values i.e. rejecting the need to replace useable products with the latest, improved products – this is inherent to an ever developing innovative society. The re-use and repair of products should be maximised alongside the production of reusable packaging etc. It would be desirable to design products which can be easily repaired or modernised in part without throwing whole products away. But more effectively the quest for ever improving, more modern products needs to be stemmed or there needs to be better handling of products through special collections which can maximise the re-use and repair of domestic and office durable goods.
16. Re-use used to play an important role both commercially and in households by means of widespread deposit refund schemes and doorstep delivery of products in refillable containers. This system itself has declined but there is now a greater understanding of sustainable development, highlighting the importance of re-use e.g. designing products for re-use.
17. It is thought that approximately four out of five people re-use products e.g. plastic bags, glass jars and bottles. There is a strong tendency for those who recycle to also re-use items – this again relates to the culture factor – if people are open to recycling they will also re-use.
18. There are good reasons for re-use:
- Energy and raw material savings – replacing many single trip products with one re-usable one, thus reducing the need for the manufacture of new products;
 - Reduce disposal needs and costs;
 - Cost savings for business and the consumer;
 - New market opportunities, for example refillable products.

19. Meanwhile there are some areas of re-use which need to be further considered:
- Stronger containers need more material, and therefore more energy to be produced;
 - Heavier containers need more transport;
 - The washing and filling process involved in re-using products may impact on the environment;
 - An evaluation of the number of return trips against the increased resource use for making it refillable is necessary to assess viability;
 - If the re-usable product is thrown away, does this mean that the resources wasted may be greater than if the product was designed for single use?
20. Re-use works more efficiently in a local environment. It is more economical if the recovery of products, cleaning, refilling, etc, takes place in a local amenity.
21. There are two types of re-use: The first is conventional re-use whereby the product is designed to be re-used a number of times before becoming obsolete e.g. food and drink containers. The second is finding new uses for used goods using an innovative approach to the use of goods that would otherwise be discarded e.g. plastic bags as bin liners.
22. Education and information is needed on the contribution that re-use can make towards sustainable development. This will help change people's habits towards waste generation.
23. It is evident from this section that education and information is key to the success of reduction and making people more aware of their contribution to waste and how this can be tackled. It is proposed that this be a key part of the Council's strategy.

Recycling

23. Recycling of materials is another important part of waste management as highlighted in the hierarchical ladder of waste management (paragraph 1.6). It is defined as the collection and separation of materials from waste and subsequent processing to produce marketable products. However, it is important to highlight that recycling should follow maximum efforts made in the areas of prevention and reduction. It is considered that there may be too much emphasis on recycling resulting in a general acceptance that generating unnecessary waste is acceptable provided that it can be recycled. As a consequence of this, people are in danger of believing that recycling is all they need to do to protect the environment from waste related problems. There is a focus on recycling single use throwaway products instead of focusing on re-use and minimisation. Rather, recycling should be treated as part of an integrated holistic approach.
24. In conjunction with prevention and reduction initiatives, recycling is an essential part of an integrated approach to waste management. As such, national and local recycling targets have been set in respect of Household Waste. The Government's national recycling targets are 25% by 2005, 30% by 2010 and 33% by 2015. These have been tailored for the local area and subsequently; Woking's recycling targets are 26% by 2003/4 and 36% by 2005/6.
25. Although involving greater use in transport and processing than re-use, recycling still saves carbon involved in the use of virgin materials. Recycling materials which need high energy input during manufacturing from raw materials, can have a significant saving in energy.

26. There are several benefits to recycling:
- It reduces the demand for raw materials by extending their life and maximising the value extracted from them;
 - It reduces habitat damage, pollution and waste associated with the extraction of raw materials;
 - It reduces transport costs and pollution from transporting raw materials and manufacturing new products;
 - It saves energy in the production process when compared with the energy consumed in using raw materials;
 - It reduces emissions to air and water in the production process;
 - It reduces the disposal impact as the more waste that is recycled means less waste goes to landfill or incinerators;
 - It offers enormous potential for job creation;
 - It promotes public awareness of environmental issues and personal responsibility for the waste we create.
27. There are two ways to recycle:
- Reprocessing dry recyclables e.g. paper, glass, cardboard, plastic, metals, textiles, can be collected and recycled either into the original product or a secondary product. Collection can be done through drop-off centres such as those found at supermarkets or through household kerbside collections.
 - Composting organic, biodegradables e.g. paper, cardboard, textiles, kitchen and garden waste. It involves composting the organic waste and turning it into a product that can be marketed as compost or soil conditioner, returning the nutrients to the land. It can be carried out aerobically at home, at community sites or at low cost central composting sites or anaerobically in an 'anaerobic digester'.
28. Anaerobic Digestion is the breakdown of organic material by micro-organisms in the absence of oxygen. This produces gases that can be used for heat or to generate electricity. Various processes have been developed, operating at different temperatures, moisture levels and speeds. All of the processes share a common approach. Shredded waste materials and water (sludge) are held in a reactor for 6 to 25 days at a constant temperature between 35 to 55 degrees Celsius. The organic waste decomposes, producing a biogas by product which can be used directly as a fuel or for electricity production. Anaerobic Digestion can treat a wide range of bio-degradable waste including wastes that are unsuitable for aerobic composting, such as meat and cooked food. The waste material needs to be collected in separate containers from other waste. The process produces a residue which can be matured to produce a compost-like product. Systems for household waste have been developed and are capable of treating between 15,000 and 100,000 tonnes of organic waste per annum. The biogas by product generated by anaerobic digestion is a clean, renewable fuel source which could help to reduce fossil fuel consumption. Removing and treating organic waste avoids bio-degradable waste going to landfill. [The compost produced by the process can be high quality provided the original material is source separated.](#)

29. An increasingly important part of the recycling process are Material Reclamation Facilities (MRFs). MRF's are usually designed in one of two ways, one is to accept mixed materials and to sort them by hand and a range of technologies or two, to receive source separated materials and deal with each material type individually. In the former arrangement, there is usually a residual element of waste that has to be landfilled or disposed of in another way, anything up to 35% of the weight of the material delivered. Additionally, the processing costs are higher due to greater labour inputs with a lower return on the sale of the material as it is not usually of a high grade. The latter arrangement usually results in residual waste of around 5%-10% of the weight of material delivered. The positive benefit is that the materials reclaimed are less contaminated and result in a higher selling price for the material.
30. In the context of the draft Climate Change Strategy this draft Waste Strategy envisages the need for source separation of the organic element of the waste stream, to maximise recycling through anaerobic digestion and the production of compost and to reduce the contamination of the non organic recyclable materials. Accordingly the Waste Collection report later in the agenda promotes split bin collection on an alternative week basis.
31. Currently, in Woking, kerbside collection of some recyclable materials are collected each fortnight by what is known locally as 'Kerbie'. At present, newspapers and magazines are collected, presented in carrier bags and, for a 37 week period, compostable garden waste is collected in Council pre-paid clear refuse sacks. Other recyclable materials are collected from 30 recycling sites across the Borough. The material collected by this method when added to the recyclables collected from the kerbside provide a recycling rate of 17.2% (as at 31 March 2002). Leading authorities are achieving in excess of 25% through a split bin alternate weekly approach to collections.
32. To ensure that recycling is a success and that targets can be achieved, publicity and information campaigns need to be carried out to encourage the public to sort and separate out recyclable material from the waste in their bins, and to ensure a high quality of sorted waste, by providing clear instructions on how to do so.
33. There is evidence to show that there is a great deal of willingness to co-operate in recycling and sorting schemes providing people are given more support by their local councils i.e. information and provision of collection containers for recycling would boost participation significantly. As with re-use, recycling also involves a high degree of changing people's habits and thoughts towards waste generation and its management.

Recovery

34. The third step to the three Rs of waste management is recovery. Energy recovery from waste is positioned below recycling in the hierarchical ladder of waste management principles, (see paragraph 1.6).
35. Energy recovery, is the term applied to waste treatment processes which use the energy held in waste to generate power and/or heat. Techniques include incineration, pyrolysis and gasification. Anaerobic digestion is also a technique for energy recovery and has the added advantage of recycling the organic element as a compost.
36. Such technologies should not be developed in isolation but have a part to be played in the process of managing waste in the most sustainable manner. In this way, they must be recognised as a method of reducing volume, not as a means of disposal.

37. It should be noted at this point that the incineration, pyrolysis and gasification technologies engender mixed feelings and reactions. Some feel that they can be thought of as sources of renewable energy, displacing the use of fossil fuels and reducing emissions of greenhouse gases. Others, particularly Non Governmental Organisations (NGOs), feel that there marketing as a sustainable source of energy is inappropriate. There are also fears that these technologies promote 'waste maximisation' as those that implement these technologies are constrained by contracts from exploring other, preferable, waste management strategies.
38. Currently, about two million tonnes, of household waste is incinerated each year, 25% of this with energy recovery. The UK target to recover energy or value from 40% of municipal waste by 2005. This could result in four fold increase in the number of incinerators if the market remains unfettered and lacking in innovation. With the Government's approach to waste issues, driven by a EU Landfill Directive and a recently issued Waste Strategy, new means of waste disposal are required. This is where energy recovery initiatives come in. Energy recovery schemes offer significant volume reduction advantages.
39. Increasingly, energy recovery from waste is being incorporated into waste management strategies. Under the UK Climate Change Programme, the Government's target is to increase CHP from 5,000 MWe to at least 10,000 MWe by 2010. Reaching the Government's CHP target would reduce UK CO₂ emissions by about 6MtC. So, with targets being set, the process of energy recovery is being employed on a wider basis to meet said targets. The majority of so called energy recovery incinerators do not use the heat, they discharge it into the air.
40. Different energy recovery techniques are available. The recovery of energy from waste is not restricted to incineration; see Appendix 3 for descriptions of various technologies.

Descriptions of various energy recovery from waste techniques

1. Mass-combustion, commonly known as incineration, is the simplest form of thermal treatment. It is arguably a form of final disposal in itself, but as about 24% of the original weight remains as ash for disposal, it can also be regarded as a treatment. Energy recovery from such plants is usually by electricity generation alone, (at around 21% efficiency). The products of incineration are ferrous metals (3% of original waste weight), fly ash (3%), bottom ash (18%), greenhouse gases, air pollutants and noise. Fly ash has to be treated as a special waste. Bottom ash occupies only some 10% of the original waste volume and so could prolong landfill life. As inert waste it could also reduce methane emissions, but because of the high heavy metal content, close control of leachate at the landfill site is required. CO₂ emissions from mass burn plants are mostly from biodegradable waste, where the carbon has only recently been 'fixed' from the atmosphere. Any carbon from fossil sources can be reduced by use of Materials Reclamation Facility(MRF) to sort out plastics and artificial textiles from the waste stream before combustion. Pollutants in flue gasses are the most controversial aspect of any incineration process, stringent limits are in force and high capital cost technology is required to clean the flue-gases. Where other industry is absent, incineration may add to local pollution and add considerably to local concerns about pollution. Noise has to be tackled by building design and situation. The economic viability of such plants would have to be assessed on a case by case basis, but 150,000 tonnes per year is an oft-quoted figure. With the mention of emissions and the increasing concerns over dioxins, incineration is often viewed as controversial. The associated negative impacts often cited and used as disincentives by NGOs, include:
 - It destroys valuable resources;
 - It exacerbates climate change as more fossil fuel energy is used to replace products through mining, manufacture and transportation. Energy from burning waste is often quoted as non-renewable;
 - It undermines Council recycling schemes by demanding long term waste delivery - it takes 15-25 years for a waste management company to make a return on capital investment which therefore binds the authority to provide an agreed amount of waste for at least 25 years;
 - Emissions are produced that are dangerous to human health;
 - The bottom ash produced may contain heavy metals and dioxins and represents one third by weight of the original waste and still has to be landfilled;
 - The fly ash produced is classified as hazardous waste and has to be specially landfilled as it contains pollutants.

2. Although there seem to be many disadvantages to incineration, modern technology and monitoring standards can ensure safer incineration. Nevertheless, alternative thermal treatments are being investigated to replace incineration technology.

3. Pyrolysis and gasification are seen as systems to replace incineration in recovering value from Municipal Solid Waste (MSW). They are often seen as a way of generating energy that does not contribute to global warming. They can be used as localised technologies and deal with community waste outputs and produce green electricity that can be delivered to the local or national grid. There are various reasons why people are turning to pyrolysis and gasification as waste treatment options:
 - Desire to recover valuable products and/or energy from wastes;
 - Negative image of incineration;
 - Perception of new processes as greener, high technology solutions;
 - Constraints of landfilling untreated waste;
 - Increasing cost of, and regulatory focus on, residue disposal from incinerators;
 - Compatible with recycling (stables residues);
 - Marketing efforts of suppliers.
4. As with incineration, there are negative impacts, cited usually by NGOs. There is concern about the release of pollutants, including dioxins and furans, as well as the potential for toxic liquid and solid residues. So, again, there arises conflict between those that market these technologies as clean, non-incineration alternatives and those that believe they still have the capacity to generate dioxins, furans and other pollutants of concern.
5. Gasification is defined as the conversion of a solid or liquid substance into a gaseous mixture by partial oxidation with the application of heat to produce fuel-rich gases.
6. The combustible gases can be cleaned if necessary, but are suitable for use in gas engines or boilers and so produce electricity and/or heat. As the major pollutants are retained in the gasification ash or residue, the flue gases from this combustion do not require the capital intensive flue-cleaning technologies of mass-burn. The economically viable level of operation is thus much lower at between 25,000 and 40,000 tonnes per year. In addition, the faster start-up of these processes means that plants do not have to run continuously, allowing plant shut down at night or weekends. The thermal efficiency is greater at 36% compared to 21% for mass burn and the system can run at less than full capacity and so is more flexible in dealing with variation in waste production.
7. Pyrolysis is where carbon based wastes are heated in the absence of air to produce a mix of gaseous and liquid fuels and a solid inert residue (mainly carbon). The process needs a consistent waste stream e.g. tyres or plastics to produce a usable fuel product. This process is sometimes referred to as thermolysis. End products include a solid char, a liquid and a gas, all of which are marketable forms of fuel and can be used in boilers, producing flue gases and ash.

8. **Fluidised bed combustion:**
This is a modification of mass-burn (incineration) rather than a different process. To improve the efficiency and consistency of combustion, waste is shredded to a uniform size and then fluidised by suspending it in an updraft of air on a base of sand particles. The costs of the necessary equipment is balanced by savings on flue-gas cleaning equipment. In some cases such equipment may allow smaller incinerators to be financially viable.
9. **Refuse derived fuel (RDF):** A Mass-burn plant's high capital costs are partly caused by the level of technology needed to deal with heterogeneous and often wet waste. This poses problems for managing the combustion process and the resulting variations in burn temperature give secondary problems in managing the flue-gas clean up process. Pre-treating waste to increase the energy density produces RDF, which burns cleaner and hotter. The high start-up costs of RDF plants and the need for guaranteed long-term contracts to secure finance for this specialised product have restricted the use of RDF in the UK.
10. **Combined Heat and Power (CHP):** CHP uses a fuel source such as a natural gas to produce electricity with the added benefit of the resulting heat with efficiencies of 80% to 90% compared with power station electricity and boiler heat with combined efficiencies of 40% to 50% due to the inefficiency of power stations and transmission systems as well as seasonal inefficiencies of boilers. In this way, where an anaerobic digester or an energy-from-waste plant is physically near a market for heat (housing, schools, hospital etc), the efficiency of all the processes can be improved by supplying hot water as well as electricity.

Woking's proposals for a new waste management strategy

Material Reclamation Facility

1. A twin bin collection system is proposed, allowing twin line processing of dry recyclables with other dry waste and the organic element. The recyclable materials for which there is a viable market will be diverted separately e.g. paper, glass, steel and aluminium etc. A shredding process will be used to reduce the waste size in each line to 100mm after removing the non organic recyclable element. The organic element will then be sent to a dewaterer to obtain the organic content which is a sludge which will then go to the anaerobic digester. The residual from both lines of processing will be put to energy recovery. Paper and card which cannot be recycled for reprocessing or reuse will be integrated with the organic element to maximise the production of compost.

Anaerobic Digestion

2. The sludge produced from the dewaterer will be used to produce water and a solid inert residue compost which can be used as a soil conditioner. The water will be cleaned and used for irrigation or subject to a discharge licence to top up the Basingstoke Canal. It is estimated that 25% of the output will be soil conditioner/compost and 75% will be water. A by product from this process is a bio gas which can be used to fire a conventional gas fire combined heat and power plant similar to the town centre, Brockhill, Priors Croft CHP plants.

Gasification

3. It is proposed to put the residual element of the waste into gasification. The proposed gasification plant is to be based on the modular approach as used by the Norwegian company Organic Power (see Appendix 4). The design will work towards that a residual element of less than 40% of the waste input, approximately 30,000 tonnes, will be sent to the gasifier. The assumed outputs are: approximately 25% ash and clinker for which there is a growing market for road construction aggregates; and up to 1,000 tonnes of lime and active carbon to landfill.

Summary

4. Based on a 77,000 tonne waste input, it is thought only 1-8,000 tonnes would need to go to landfill – which is addressing the main concern of reducing landfill. The emissions from the plant (combined gasification and anaerobic digestion) will be well within EU 2000 standards. The electrical and heat outputs could serve many homes and businesses and further displace CO₂ emissions.

Environmental Assessment

5. It is essential to ensure that any proposed technologies are environmentally sound. As stated the proposed technologies of gasification and anaerobic digestion are will be well within the EU 2000 standards although this will need to be proven in a full feasibility study.

6. The proposals incorporate prevention and reduction strategies. In addition the proposals seek to maximise viable recycling through the proposal of a twin bin collection system (see separate collection report) and the material reclamation facility.
7. Concerns will be raised relating to emissions but these will be addressed. There is inherent mistrust of waste processing plant, it is proposed to have a lay visitors panel with representatives separate from the development and the Council who can visit the plant at any reasonable time to view the proceedings. There will also be information available at all times on the web as obtained from the monitoring of emissions. It is believed that the proposals are truly helping the environment and that the transparency about proceedings and readily available information will aid public confidence.
8. The proposals would result in a substantial reduction in CO₂ emissions – possibly in the region of approximately 100,000 tonnes.
9. A substantial benefit of this proposal is the proximity principle – i.e. employing the “island Woking” Zero Waste approach. This not only ensures no import or export of waste to or from of the borough but also minimises the potential transportation impact.
10. The proposed waste management strategy has the potential to reduce landfill by approximately 98% if the market for the gasification residue (i.e. in construction) is developed. If this proves unsuccessful, landfill would still be reduced by 88%.
11. Although employment is often highlighted as a benefit associated with labour intensive waste management strategies and recycling in particular, this is not the case for Woking as the borough does not have an employment surplus which could be utilised for this purpose.
12. Overall, this waste management strategy provides a practical, holistic approach to addressing the waste stream. It is an integrated approach which incorporates waste prevention and reduction with recycling in a flexible way based on viable markets. Biodegradable waste is recovered for use as soil conditioner and for energy recovery. The water which results from the processing of the waste would be recovered for use after treatment for irrigation in parks or for use in the Basingstoke Canal. The energy from the residual waste is recovered and the material is reduced safely and within relevant emissions standards. In summary, the proposal covers the three Rs of waste management: reduction, recycling and recovery.

13. The following table illustrates the effect of processing the waste proposed based on the desk top assumptions about the composition of waste (Appendix 1 Table 5)

Total Treatment Analysis		
	Tonnes	%
Recycled		
Non Organic	9,529	12.4
Biodegradable	37,051	48.1
Total	46,580	60.5
Energy Recovery	28,520	37.0
Not Processed	1,900	2.5
Total	77,000	

14. Of the total waste processed the household element (Municipal Solid Waste) is some 30,000 tonnes, the following table illustrates the effect of processing of the household element.

Household Treatment Analysis		
	Tonnes	%
Recycled		
Non Organic	5,235	17.5
Biodegradable	14,742	49.1
Total	19,977	66.6
Energy Recovery	10,023	33.4
Not Processed	0	0.0
Total	30,000	

Results of initial research and discussion with key environmental groups

Context

Concern surrounding waste disposal and incineration in particular have meant there is now a great deal of political debate surrounding the development of strategy in this area by Local Authorities. This has thrown the need for carefully managed, participative development processes into sharp relief. Experience has shown that the 'green credentials' of a scheme alone are not necessarily sufficient to gain its public support. Developers need to be fully cognisant of public perceptions, the supporting and contrary arguments advanced by stakeholders, and to understand how their requirements might be addressed to mutual benefit.

On behalf of Woking Borough Council Thameswey Ltd. are developing a programme to reduce the amount of waste produced within the borough going to landfill sites to 2-15% of existing volumes. Following an initial private briefing session to councillors the Executive Director has been asked to seek the views of a range of environmental groups in relation to this proposition. To encourage dialogue and to foster the perception of independence in researching these views **ecscConsulting** were commissioned to undertake this research. (For purposes of this document this Waste Management Strategy is referred to as the WMS).

The work programme comprises two phases. The first phase covers the initial research and discussion with key environmental stakeholders, and is the subject of this report. The second phase is a longer-term process of public dialogue and participation to allow the local community the opportunity to react to the proposals and to allow a broad spectrum of views to be considered.

Phase 1 was carried out in two parts:

- 1 Overview: Literature review and initial research (Primary focus on NGO documents, position papers and statements),
- 2 Preliminary discussion with campaigning groups and their delegates. For purposes of this proposal we have assumed a minimum of three and a maximum of 6 groups will be consulted subject to availability to Produce draft report.

Research Methods

A literature and internet search was carried out covering a broad spectrum of NGOs and trade associations. The research was undertaken by a team of two researchers and a lead consultant during early July and was a mixture of desk-based research, literature review and analysis of public statements, position papers and strategy documents. The initial review phase was complemented by a series of discussions held directly with representatives of campaigning groups and specialist organisations.

Although the focus was on the NGOs as the main anticipated source of public comment on the WMS, a brief review of the other organisations listed was undertaken to provide a balanced perspective on the NGOs position. In broad terms there were often few discernible

differences between the views expressed by the NGOs. Particularly as in many cases the thinking contained within the WMS is considerably more developed than their own. For brevity the report focuses only on the expressed areas of difference.

Most focus is given to the views of Greenpeace and Friends of the Earth. The reasons for this are that they have expressed views covering the entire area of waste policy. Both organisations are mainstream environmental NGOs and are not specifically focussed on any one area, for example waste to energy, market development or recycling. They are independent from government. Both organisations have networks of local activists who may feel inclined to influence the WMS.

NGO perspectives on the proposal - Overview

Non-Governmental Organisations (NGOs) contacted were those felt to have the most significant views in these areas, or who have historically used local activists and networks to develop public concerns over the Waste Management practice. A full list of the organisations considered in the review NGOs contacted included: Friends of the Earth, Greenpeace, National Society for Clean Air, National Asthma Campaign, GAIN, Wastewatch, Community Recycling Network, Forum of the Future, The Green Alliance and Eunomia Research and Consulting. Eunomia recently completed research examining recycling rates in the UK, the scope for improving them and an analysis of the various options available for treatment of the remaining residual waste. A full analysis of this research is outside the scope of this report, however the key findings of the research have been included as they are likely to inform and guide the future development of Friends of the Earth and Community Recycling Network positions in the future.¹

General:

There is common agreement of the need to reduce landfill and adopt a more holistic and sustainable approach to waste management. Many respondents also argued that the philosophy of waste as a 'problem' rather than treating it as a valuable resource needs to be readdressed. Greater flair and imagination in tackling the waste 'problem' was a common theme.

The government strategy in response to tightening legislation from the EU has been to support the development of recycling schemes and more incinerators for municipal; solid waste. With the publication of the Waste Strategy 2000, Government strategy also aims to increase the scope for recycling and composting in order to meet the increasingly stringent EU legislative requirements. The following targets have been adopted: The targets for recycling/composting are to be a minimum of at least:

- 25% of household waste to be recycled/composted by 2005;
- Rising to at least 33% by 2015;
- to recover value from 40% of municipal waste by 2005;

¹ *Maximising Recycling Rates tackling residuals* – Eunomia Research and Consulting for the Community Recycling Network Oct 2002

- by 2010 to reduce biodegradable municipal waste landfilled to 75% of that produced in 1995.

Most of the focus of NGOs appears to be on recycling rather than landfill and residual treatment targets. Many of the NGO responses consider that current targets for recycling rates are challenging in the short term, yet very unambitious over the medium term. They also argue that much higher levels of recycling are achievable than are currently called for by the targets. FoE, Greenpeace and The Green Party for instance all cite recycling rates of over 60% as being readily achievable (the Green party call for a 60% target by 2007, whereas FoE and Greenpeace suggest 50% by 2010 and 60% by 2015.). Previous FoE/ Community Recycling Network research suggests that 80% of material could be readily recycled. The Green Alliance felt that whilst recycling targets in isolation were not challenging meeting the landfill reduction targets would be difficult. The other common criticism was that targets were too short term and failed to send a sufficiently strong long-term signal to local authorities and those involved in waste management that investment in sustainable waste management will be nurtured by a supportive legislative environment and adequate market development.

...a recycling rate of 62 per cent for household waste should be achievable in England. It should be possible to implement the service delivery and promotion developments identified within 3-5 years, given the political will. However, securing sufficient public participation to achieve 62 per cent recycling will be a difficult challenge. Nearly everyone is sympathetic towards recycling and, intuitively, thinks that it is a good idea, but a step-change in attitudes will still be required to give waste issues a higher priority in everyday life. It would help if local and national government gave a greater sense of direction and leadership, so that regulatory and economic frameworks were more supportive of waste reduction, reuse and recycling. ²

Whilst there were a number of comments along the lines of “we don’t want it burnt or dumped” It was notable that the issue of market development is given little attention as a necessary driver for increased collection and use of recycle. Whilst a number of individual activities³ are seeking to demonstrate market development, broad development of materials market is in a stalemate, with NGOs calling for stronger legislative requirements, and Government citing its current activities under the WRAP (Waste and Resources Action Programme).

To sum up there are some differing perspectives on targets and timescales but, there is, a common request for a much more ambitious and imaginative approach to improving recycling and avoidance of landfill and incineration. This complements the scale and spirit of the Thamesway WMS Irrespective of the differences in approach - some significant - in choices of technologies and methods and we recommend that it continue to be communicated in this way.

² **Maximising Recycling Rates tackling residuals** – Eunomia Research and Consulting for the Community Recycling Network Oct 2002

<http://www.crn.org.uk/publications/research/index.html>

³ (Community Recycling Network – case studies: <http://www.crn.org.uk/about/cases/index.html>)

Proximity

There were few clear answers in this area from any of the NGOs. There was support from all groups contacted that waste miles should be a key performance indicator of any new strategy and that local treatment and facilities were clearly desirable. However few had any specific thinking on where a balance should be struck between local collection and reprocessing/recovery as opposed to more distant recycling. The National Society for Clean Air (NSCA) were perhaps most specific. From an environmental protection perspective there was - they argued - fairly rapidly a “point at which it made no sense to transport materials for recycling as this would require more energy than the value of the energy that could be recovered”. NSCA research, suggested that paper and card had a very low mileage threshold before it became more sensible for use in thermal treatment or anaerobic digestion.

The WMS could therefore seek to gain common support for locating the facilities within the waste producing area, and highlighting the fact that their handling capacity is deliberately modest, in relation to more conventional incineration plant. WBC and Thameswey could also justifiably cite the lack of other quantified best practice on proximity issues to their own advantage and gain support by being seen to be proactive and ‘ahead of the field’ in seeking to establish their own balance.

Reduction

The assumption of annual growth of 3-5% in waste volumes (Environment Agency 2002) is challenged by a number of NGOs. They argue that to plan for this growth is to accept it and that reduction is possible given sufficient attention to public awareness campaigns and adequate inducements to local authorities and the public to focus attention in this area. FoE cited an example in Essex where local campaigning activity had actually achieved a reduction in overall waste volumes.

We consider it over-pessimistic to believe that waste arisings will continue to grow and believe that this trend can be slowed and ultimately reversed.⁴

Many of the groups contacted cited the principles espoused by the ‘zero-waste’ movement as a valuable philosophical guide and felt it would send useful signals to government and the industry if Local Authorities were able to subscribe to the Zero Waste agenda as an aspirational target. Having reviewed the various positions we feel it will be important in securing public support to adopt as a headline objective of the WMS the intention to develop public awareness and support efforts to reduce and recycle waste arisings. Adoption of the principles and spirit of Zero waste at a corporate level could complement the WMS and be one relatively simple method of being seen to support this.

Collection

All the NGOs contacted wished to see the provision of universal kerbside collection schemes to enable householders to participate in recycling. The majority also sought separate collections for ‘dry’ recyclables and biodegradable and residual materials. Which they argued was most efficiently undertaken at source. The separate collection of kitchen waste is necessary to comply with the new EU animal by products regulations. They also advocated

⁴ **Maximising Recycling Rates tackling residuals** – Eunomia Research and Consulting for the Community Recycling Network Oct 2002

optional garden waste collection as the proportions of kitchen/garden organic waste entering a composting stream can then be regulated in density and volume for the best results.

Eunomia were clear that to produce marketable products (soil conditioner) from organic waste would require good source separation of all kitchen and garden wastes from the rest of the waste stream. This requirement is likely to be implemented in a forthcoming EU Directive (currently at consultation stage) on biological wastes. Mixed collections result in contamination by heavy metals of the organic fraction as a consequence of chemical interactions within the collected material. The non-source separated mixed scenario would effectively be treatment of waste prior to landfill rather than producing a product. The directive also suggests that a third grade higher contamination limit material bio-waste will be permitted for spreading on land but the restrictions on its use will make its market value negligible. Source separation avoids this they argue and allows the product to be composted/anaerobically digested and sold.⁵

There is an assumption here about the willingness of individual householders to voluntarily sort materials and little apparent consideration of the impact of requiring this activity on compliance levels.

It has been shown to be a crucial element of any well functioning recycling economy to have a good, streamlined quality of input to enable effective management and production of marketable products.⁶

They argue that concerns regarding public participation levels, are of lesser importance and can be overcome than the downstream problems created by collecting and treating mixed waste. To enable the separation at source most recommended compartmentalised collectors (bins, containers etc.) with collections on a rotating organic/residual weekly basis.

Whilst the provision of 100% kerbside collection will be welcomed by NGOs it may be useful to revisit the decisions proposed on collection methodologies in order to retain where possible pressure group support for this element of the programme.

In support of these arguments they cite examples of successful local authority action in spearheading reduction and recycling activity. Notably Edmonton - Canada, Massachusetts – US, and some examples in Denmark. UK examples include Wealden - East Sussex; Mersea Island - Essex; Isle of Wight – and Daventry. The Community Recycling Network cite numerous examples of doorstep collection and recycling which have grown from fledgling community based projects frequently centred around employment and training initiatives. Most NGOs argued that community recycling created greater employment and economic benefits than incineration or landfill.

Sorting

Respective opinions on the use of Materials Reclamation Facilities were really a function of the upstream sorting undertaken on any specific scheme. The more intensive the kerbside collection the smaller the MRF required to process. As most of the groups contacted strongly support separation at source, there was little comment on sorting options. However, the CRN

⁵ Interview Jo Papaniski – Eunomia Research and Consulting

⁶ op. cit

commenting on current practice highlight the fact that large MRFs are not generally very efficient in separating materials. In a press release Apr 2002 they state:

The Community Recycling Network welcomes plans by the paper industry to dissuade local authorities collecting paper mixed with dry recyclables. Councils that collect commingled materials from the kerbside for sorting at large MRFs have been given three years by the Paper Federation to introduce separated collection, in a report entitled Implications for Future Paper Recovery Schemes

"The dinosaur-sized MRFs which take mixed domestic recyclables are currently heading for extinction," says Andy Moore, CRN's coordinator. "Many large MRFs end up consigning large percentages of perfectly recyclable material to landfill. This is due largely to the poor quality of input material and unrealistic expectations about how such material can be sorted mechanically or by hand at speed.

"Community sector MRFs, dealing with specific parts of the waste stream sorted by the householder, achieve average reject rates of four per cent of input material. .⁷

The issue of working conditions for employees did not feature in any of the NGO statements.

Residual material considerations

Incineration is opposed as an option by all the NGOs with perhaps the exception of NSCA under certain circumstances. Reasons for opposition show some variance. The general point is that the scale of both individual installations and the place of incineration within the Waste Strategy will make market development for recycle impossible and that major energy from waste programmes are incompatible with recycling. NSCA whilst not pro incineration make the point that the health issues associated with incineration and thermal treatment generally have been liberally used as scare tactics by FoE and Greenpeace in order to develop a broader political agenda in support of recycling. (Although our discussions with FoE suggest they may be moving slightly away from this position in certain circumstances). They argue that some thermal treatments have an important part to play in waste strategies and that valuable opportunities to include this are being missed by the activities of local campaigners instigated by these two groups.

With regard to treatment of the residual fraction of the waste stream once the maximum amounts of recyclables have been removed, the groups differ, or in some cases have little to say. Greenpeace make the case for *Mechanical Biological Treatment* and then accept that a remaining fraction will still require landfill. However they also argue that this material will in time be reduced further by packaging and producer responsibility legislation.

FoE has commissioned research from the Community Recycling Network to look at alternative options for landfill and to provide a further analysis on recycling rates. The life cycle analyses undertaken of residual treatment technologies yields a variety of different options with no one single option faring best under all criteria. The authors suggest that shortcomings in modelling make it difficult to make clear judgements on differing options,. The two worst performing technologies are a UK standard incinerator and landfill. In

⁷ Community Recycling Network – Source:<http://www.crn.org.uk/news/press/PR050402.htm>

strategic terms they place most emphasis on pre-treatment and good sorting and separation methodologies, which will allow the growth of recyclables, prior to any residual considerations. Given two key assumptions that high rates of recycling (over 60%) can be achieved within ten years, and that recycling rates rise rapidly in response to the introduction of source separation schemes, the crucial issue is to ensure that “only residual waste is being treated by residual waste options”.

They argue that as the legislative climate tightens and the wide range of current residual treatment technologies mature, local authorities would do well to consider interim, flexible environmentally friendly options until such time as these choices become clearer. They advocate good source separation and recovery probably through MBT followed by landfill as this allows a flexible approach which can deal with reducing amounts of waste.

The trap awaiting the unsuspecting is over specification of fixed throughput, capital intense facilities. A consideration of the dynamics of waste strategy is needed to inform the development of such strategies.In treating a rapidly declining quantity of residual waste, it is clear that a fixed throughput facility with high unit capital costs is completely inappropriate. More likely, local authorities with available landfill void should continue to use landfill as the mechanism for treating this declining fraction.

Flexibility is at a premium. This means that facilities, which can be switched from treatment of residual waste to treatment of source-separated materials or can have their throughput reduced over time with minimal consequences for cost and environmental performance, are especially useful. The most likely options are:

- *Untreated landfill, though the environmental consequences of this may rule it out. Mechanical biological treatment of residual waste with the stabilized residual being sent for landfilling or one-off landscaping;*

Only for the fraction likely to remain as residual waste for over a decade are the arguments for fixed throughput, high unit capital cost investments more compelling. Given the uncertainties in respect of total waste quantities, there may be more merit in opting for modular approaches using mechanical biological treatment of residual waste. Treated material could be delivered to dedicated, small-scale recovery facilities (typically fluidised bed facilities, possibly gasification or pyrolysis).

Clearly the public debate concerning treatment options for residuals and the percentages that can be categorised as residuals is not yet concluded despite release of the recent research. This doesn't intrinsically mean that the balance of opinion is against the treatment technologies proposed in the WMS but that the public, legislative and technical context is still in transition and that the final position cannot yet be predicted. The WMS will need to keep abreast of this 'dynamic' and recognise that in adopting particular courses of action at this stage it will be seeking to be ahead of but in accord with future public opinion.

Anaerobic Digestion

Groups provided a range of perspectives for treatment of organics. Most NGOs contacted were generally supportive of anaerobic digestion although there was some call for promotion of home composting first, despite recent fears about health impacts of home composting units. Some of the groups suggested that these health concerns were rather overstated and

that issues really only arose in the decomposition of meat and animal wastes, which were rare/unlikely in home composting units.

The NSCA suggest that best practice on different treatments for organic waste (home composting, centralised open/closed composting and anaerobic digestion) is still undefined. They recognise the detrimental effects of home composting in terms of methane and pathogen emissions, but also some emissions and bio-aerosol issues associated with AD and other centralised treatments. However NSCA strongly suggested that these health concerns were frequently excessively whipped up by NGOs (principally Greenpeace and FoE) as part of a broader political agenda to augment their recycling arguments.

Eunomia suggested that the main issues surrounding use of AD as a technology begin at the source stage. Early separation would allow the development of clean products, which would be marketed. Heavy metal residues from the collection process would inevitably contaminate 'grey compost' input (organic wastes previously mixed with other wastes). Mixed waste schemes were currently finding it extremely difficult to sell their products particularly as production from other high quality composting schemes was increasingly capturing their existing markets.

Additionally they also commented that a lot of energy would be required in drying of the residue to a condition where it was marketable. Clearly this would have implications on the net generating capacity of the plant and a balance would need to be found, between the value of the energy generated and the net value of the soil conditioner once stabilised and dried. They recommended consideration of a possible alternative approach. They suggested a two-stage modular system. This process would either aerobically or anaerobically compost the source separated organic waste to produce soil conditioner and a second stage repeating exactly the same process for mixed residual waste. Aerobically composting residual waste could produce a higher efficiency residual fuel for gasification purposes. This would be derived from a combination of the biological waste products and the remaining residual waste stream. The modular system would allow longer term flexibility with more units in the initial years processing mixed residual waste, but being gradually dedicated to source separated organic material as the capture rates increase. (Examples of good practice in Central and Southern European).

Greenpeace do not appear to inherently oppose anaerobic digestion (AD). Greenpeace and a number of other NGOs highlight the benefits of home composting for garden waste through small units. They are concerned that contamination in feedstock's for AD processes can result in contaminated residues. They also cite higher capital costs than composting and the fact that emissions are generated from converting the gas to energy.

Anaerobic digestion offers a practical way to treat organic household waste. However, home or community composting is a better option and should be encouraged ahead of anaerobic digestion. The composting process holds onto a much larger proportion of the carbon present in the organic waste and thus less carbon, in the form of carbon dioxide and methane, is released into the atmosphere. The retention of organic carbon in the soil is good both for the soil and for plant life.⁸

⁸ Wastewatch – Information Sheet: Anaerobic digestion.

Source: <http://www.wastewatch.org.uk/informtn/efw.htm#background>

Curiously all the NGO statements neglect to mention that although smaller, the emissions of methane and carbon dioxide from home composting are not captured for use.

Residual Gasification

For gasification the position is more complex. In a report of April 2001, FoE stated that it 'opposes gasification for the 80% of municipal solid waste that can be recycled or composted because it wastes valuable resources, contributes to climate change and provides very few jobs'.⁹ They are also concerned that although generally smaller in scale than incinerators for Municipal Solid Wastes the nature of the investment required will lock local or waste collection authorities into a contract to source a fixed tonnage of waste as a feedstock and that this mitigates against reduction reuse and recycling development.

The research recently completed by Eunomia for the Community Recycling Network for FoE included extensive modelling of a range of different technologies for residual treatment of waste. Whilst they don't examine gasification in depth they provide comparative estimates for a range of other thermal treatment options including a range of differing incinerator specifications and pyrolysis. This doesn't rule out the use of gasification, which they say performs well in comparison to other options.

There is likely to remain an issue for FoE regarding the proportion of the waste stream channelled through the gasification plant. Initial estimates suggest approximately 65% if the stream will be handled through the gasification plant. They will argue that this be brought nearer to the 20% of materials that (they argue) are not readily recyclable, with the change in fractions being achieved through source separation and processes.

They added that although they acknowledged differences in technological performance between the different thermal treatment options for residual waste (incineration, pyrolysis and gasification) if they felt the WMS was likely to inhibit recycling they would oppose it on the same grounds as incineration. (A fuller breakdown of the main arguments against incineration is included in the appendix. (See friends of the Earth – Gasification).

Greenpeace advocate the role of Mechanical Biological Treatment (MBT) for the residual fraction. This can produce some further recyclate streams and reduce the remaining fraction by 50%. They then suggest that landfill is the best disposal option for the remaining amount, (This is suggested as a short term measure until the objective of zero waste can be achieved.) They argue that this is significantly more environmentally benign than incineration on the basis that the "greatest derived calorific value is from plastics which is 'equivalent to burning fossil fuels' and paper/card, which should in any case be recycled". Again they neglect to mention the methane given off from landfill.

Greenpeace also suggest that there is no more proven advantage to gasification and pyrolysis than 'mass burn' incinerators.

"Neither of these claims [lower pollution/higher thermal efficiency than incineration] have been substantiated by operating plant.Results with municipal waste are not encouraging, for plants of the type or scale applicable to UK municipal waste, However it

⁹ Friends of the Earth Briefing, *Waste Management Methods*, 2001, p4.

*is clear that gasification has many of the same problems as conventional incineration... Test data and Environment Agency Licences for the pilot projects in the UK and data from plants in other parts of the world reveal the same pollutants released as in conventional incineration and in quantities of the same magnitude. Gasification and pyrolysis are not solutions to the fundamentally dirty and flawed practice of mixing municipal waste and then trying to dispose of it."*¹⁰

A somewhat more measured assessment is offered by Wastewatch

The strength of pyrolysis and gasification techniques lies with their production of low atmospheric emissions and saleable fuel products. The markets for these fuels are well established and should be able to offset the pre-processing costs. These factors should see them take a market share from the cruder, more conventional incineration plants, which are predominant in the market place. Both these techniques complement recycling with inert waste being recycled and the potential for materials such as paper and plastics to be recycled when the price in the market is high, and converted to a useful fuel when the price is lower¹¹ (Authors emphasis)

It is perhaps significant that both Greenpeace and Friends of the Earth deliberately tackle gasification alongside incineration with minimal effort at differentiation of the technologies. Similarly gasification is opposed on the grounds either of crowding out recycling, or that it is unsafe or unproven. The first argument relies on the premise that the gasification technology is being installed at the expense of any other attempt to pursue the waste hierarchy. Their second argument draws on cases studies employing considerably different technologies and feedstock's than that proposed in the WMS. They are generally larger scale, and have a large number of mechanical moving parts.

Eunomia suggest that although some gasification and pyrolysis systems can compare well with best practice incinerators (none of which currently exist in the UK) technological and performance uncertainties remain. There is general concern that these technologies are not yet proven on both efficiency and technological grounds and that a waste collection authority considering procurement would be taking an unnecessary gamble, with technological performance both in terms of reliability, operating efficiencies and public acceptability.

During our interview with a Eunomia member of staff, suggested that campaigning organisations particularly FoE were corporately reserving their future positions on gasification and thermal treatment at this stage and using their support/opposition to it as a bargaining position in their incineration campaigning objectives. (This is in accordance with the 'off the record' campaigning position set out by the FoE national waste campaigner in our interview).

¹⁰ How to comply with the Landfill Directive without incineration: A Greenpeace blueprint. - October 2001.
Source: www.greenpeace.org.uk

¹¹ Wastewatch – Information Sheet: Energy from Waste.
Source: <http://www.wastewatch.org.uk/informtn/efw.htm#background>

Anti gasification campaigns were likely to draw on the fact that emissions to air from the gasification process result in a finer particle than other combustion technologies, therefore more damaging to lung tissue. This has been a major campaigning point in anti gasification campaigns both in Britain and abroad and that FoE would use this as a campaigning point if they do not receive a satisfactory solution from government with regard to their main anti incineration campaign. The Eunomia interviewee concluded that although there was highly likely to be a role for gasification in the medium term, but for the present the political, campaigning, planning and public acceptability context would be too uncertain to make it a major strategy option this stage. Additionally given the lack of maturity in the markets and these technologies it was likely that any local authority going to procurement was unlikely to get a good deal as companies were likely to provide services at a premium in order to offset their research and development costs.¹²

He suggested that it would be a useful bargaining position with the disposal authority Surrey County Council to be seen to be seriously considering this, given the context that SCC were unlikely to get any approval for siting bigger plant within their area, and that this could bounce them into getting more local initiatives underway.

In taking forward these proposals it will clearly be well worth highlighting the differences in the favoured option; that it is small, modular, has no moving parts and that verifiable data is available from the operation of sister plants in Norway and South Korea.

Conclusion and Recommendations

All the groups consulted in the research welcomed the proactive move to a more holistic approach to waste management and their desire to minimise the environmental footprint of the Borough. This can be harnessed to gain general support from environmental groups with discussion and debate limited to specific elements and details of the process. Our discussions also suggest it is likely to attract the tag of best practice, which clearly could be beneficial to the Borough. Early disclosure of ideas and transparency in our approach to environmental groups has also been welcomed.

We have found clear scope for widespread support for a scheme, which is sufficiently flexible to trade in **both** recycling of materials and energy recovery, in a modulating fashion dependent on the state of recyclate markets in the medium to long term. The key will be to ensure that the scheme is seen to avoid generating a long-term market for waste, strives to increase recycling of materials where possible and can offer benefits both for local recycling activities and the controlled use of innovative technologies to maximise benefits to the local economy and the environment during periods of low level market demand.

There is broad agreement that forthcoming European legislation on the treatment of biological wastes will provide legislative justification for what many of the NGOs have been campaigning for, separate collection and streaming of kitchen and garden wastes from the residual waste fraction. This - they argue - coupled with good materials reclamation facilities and sorting methodologies could realistically generate significant increases in recycling levels. The focus of NGO effort and waste strategy generally has been to enable high levels of recycling activity. More recently they have acknowledged that there remains a question over what to do about the residual fraction. Traditional responses to this;

¹² Interview Jo Papaniski – Eunomia Research and Consulting

incineration or landfilling, are inadequate, yet have been allowed to dominate this question and the evolution of national waste strategy.

Despite a significant and growing body of research into treatment technologies for the remaining residual waste fraction, apart from opposition to standard incineration, and untreated landfill few simple positions emerge. The anaerobic digestion process appears relatively uncontroversial. The economic and environmental value of the process is greatly dependent on the quality of the feedstock and the extent to which the biological waste fraction is streamered prior to collection.

Gasification is generally treated cautiously with many preferring a non-thermal treatment such as mechanical biological treatment with landfill. However a few groups are categorically opposed to gasification. Dependent on size of the installation, concerns about safety, economic and environmental performance there does appear to be some room for compromise with some groups appearing to reserve judgement until the balance of technical, political and public acceptability opinions become more clearly discernible.

At this stage it has been difficult to draw comment from spokespeople on scheme details, as they are reluctant to comment much beyond the agreed national policy positions. Groups may still subsequently galvanise campaigns on specific issues later on. However, lack of detailed responses and cautious enthusiasm expressed by groups can still be legitimately cited as seeking to consult and build on best practice. In short the lack of good examples provides the perfect opportunity for someone to invent one!

Recommendations

- There is, a common request for a much more ambitious and imaginative approach to improving recycling and avoidance of landfill and incineration. This complements the scale and spirit of the Thameswey WMS irrespective of the differences in approach - some significant - in choices of technologies and methods. Additionally the openness and clear desire of the WMS development team to consult early on with NGOs has been welcomed – especially commissioning an independent agency to gain impartial perspectives on the proposals. We recommend that it continue to be communicated in this way.
- The WMS could therefore seek to gain common support for locating the facilities within the waste producing area, and highlighting the fact that their handling capacity is deliberately modest, in relation to more conventional incineration plant. WBC and Thameswey could also justifiably cite the lack of other quantified best practice on proximity issues to their own advantage and gain support by being seen to be proactive and 'ahead of the field' in seeking to establish their own balance.
- Having reviewed the various positions we feel it will be important in securing public support to adopt as a headline objective of the WMS the intention to develop public awareness and support efforts to reduce and recycle waste arisings. Adoption of the principles and spirit of Zero waste at a corporate level could complement the WMS and be one relatively simple method of being seen to support this.
- Whilst the provision of 100% kerbside collection will be welcomed by NGOs it may be useful to revisit the decisions proposed on collection methodologies in order to retain where possible pressure group support for this element of the programme.
- Public debate concerning treatment options for residuals is not yet concluded and the final balance cannot yet be predicted. The WMS will need to keep abreast of this 'dynamic' and recognise that in adopting particular courses of action at this stage it will be seeking to be ahead of, yet in accord with future public opinion. Perhaps the key elements to bear in mind in seeking to adopt an appropriate future strategy are flexibility and the use of modular systems to allow the treatment initially of high levels of mixed wastes, which can later be rededicated to high quality source separated wastes as capture rates increase.
- In taking forward these proposals it will clearly be well worth highlighting the differences in the favoured option; that it is small, modular, has no moving parts and that verifiable data is available from the operation of sister plants in Norway and South Korea.
- As many of the key NGOs appear to be reserving judgement on gasification subject to other strategic developments the WMS development team, will need to be seen to have completed a full BPEO appraisal and also to demonstrate that the chosen technology is favourable in economic, technical and environmental grounds.

- As many of the NGOs may yet seek to galvanise local campaigns against elements of the WMS for their own respective reasons, we recommend that every effort is made to retain a meaningful consultation dialogue with them as the proposals evolve.

Appendix 1 – NGO perspectives

List of groups contacted during initial research phase

Sector
NGOs
Friends of the Earth
Greenpeace
National Society for Clean Air
National Asthma Campaign
GAIN
Wastewatch
Community Recycling Network
Forum of the Future
Green alliance
Juniper
RSPB
Clean Merseyside Centre
Noise Abatement Society
National Trust
Women's Environmental network
Lets Recycle
Political Parties
The Green Party
European union
Four main political parties
Local Regional Govt
Regional offices: GOL & GOSE
Surrey CC
Woking BC
GLA
Agenda 21
Media
The Times
The Guardian
The Telegraph
Washington post
Business Derbyshire
Think Tanks
The Institute for Fiscal Studies
DEMOS
IPPR

	Social market foundation
Comm. Orgs/Trade	AssociationsThames waste management
	Compact Power Ltd
	Composting Association
	Organic Power
	The ENDS report
	Committee of Medical Effects of Air Pollutants
	Health Care without harm
	Department of Health
	Caddet renewable energy info store
	Environmental Services Association

Whilst it is outside the scope of this report to provide a full discussion of the positions of all the NGO groups contacted material collected from these sources has where appropriate been retained in the research file (already submitted). In the majority of cases the stance of the groups fall into two categories.

- Pro increased recycling.
- Environmental/health preservation campaigns such as National Asthma Campaign or the National Trust.

In both cases we were surprised by how little they added of relevance to the WMS, our knowledge-base and the debate concerning markets/mechanisms and use of new technologies.

Below however we set out the arguments of the two main NGOs who actively campaign in this area and have provided responses of significance to the shaping of the WMS. Additionally we also describe briefly the Guildford anti incineration campaign which provides a good example of local perceptions of energy from waste proposals and the influence of the two featured national NGOs on local activity.

Friends of the Earth - www.foe.co.uk

General

Friends of the Earth (FoE) strategy on waste issues follows is basically modelled on the 'waste hierarchy'. This is a sequential approach advocating *Reduction*, (in consumption patterns generally, and packaging and waste arisings) *Reuse* (items such as bottles) and *Recycling* (the streamered collection of a range of organic and inorganic material to enable its processing and subsequent marketable use). The implication for the WMS is that support from this organisation will only be achieved through a programme that first aimed to reduce and reuse waste rather than reprocessing all the materials.

Friends of the Earth supports neither landfill nor energy from waste incineration as a means of waste management and actively campaigns against them. They cite a number of arguments against these approaches, the common characteristic is that they do not make an efficient use of the waste 'resource' as they displace markets for recycling and generate long-term markets for waste. They are also concerned that such schemes send a signal to the public that existing levels of waste generation are acceptable.

They much less clear over options for treating the 'residual fraction' of the waste stream. They are currently commissioning further research on this and it may be that different conclusions will be drawn regarding the levels of recycling that are achievable.

Gasification

As gasification is a relatively new process within the UK, there isn't a great deal of comment on this however the organisation has had some campaigning experience with it. In a report of April 2001, FoE stated that it 'opposes gasification for the 80% of municipal solid waste that can be recycled or composted because it wastes valuable resources, contributes to climate change and provides very few jobs'.¹³ Whilst there is some scope for gasification within their arguments however, as the case of Derby shows, the local position may frequently be less open to the prospect of gasification.

In much of the campaigning activity against the development of incinerators, arguments have also been applied that may have a bearing on the public acceptance of gasification as an alternative. The proposals for the incinerator at Slyfield Industrial Estate in Guildford were hampered by well organised, effective local campaigning which culminated in Surrey County Council not granting planning permission for the project. Friends of the Earth were against this proposal and supported and provided advocacy assistance for the local protest groups. In their incineration campaign guide, FoE outline some of the main arguments that are used in campaigns against incinerators. Arguments listed here are those that may also be applicable to gasification.

- Waste management plants create much fewer job opportunities than recycling schemes and Friends of the Earth believe this objection applies to mixed municipal wastes as well as specific waste streams.
- Energy creation is often only enough to offset a proportion of the energy that could have been saved had the waste materials been recycled rather than used to create energy. 'On

¹³ Friends of the Earth Briefing, *Waste Management Methods*, 2001, p4.

average, using recycled materials saves 2-5 times as much energy than can be recovered by incineration'.¹⁴ Unless the plant generating efficiency statistics are markedly different for gasification processes as compared to incineration, this argument may be used in objection to gasification below the 80% target line.

- Although the project may meet the specified emissions targets, the IPC targets are not thought to be stringent enough, as they take no account of cumulative or synergistic impacts of each additional source of pollution'.¹⁵ While the EU emissions targets are more stringent and these are those that the plant is aiming at, this objection should be considered.
- Incineration is often argued to be creating a market for waste, if a contract is signed by the council with the operating company for a 20 to 30 year period the council effectively agrees to provide a certain amount of waste for that duration. This, it is argued, reduces the incentive for implementing minimisation schemes and recycling schemes that will have to play a major role in solving the waste problem in the longer term. Although the gasification proposals are small and modular, it can still be argued that in order to secure capital investment, a base volume of operation will need to be specified, which in turn creates a barrier to increasing recycling, reuse rates.
- FoE support the recycling of both paper and plastics. They are likely to object to their use as a feedstock for either gasification or the anaerobic digestion process as they would prefer to see source separation and reuse as opposed to reprocessing. Loss of these two streams to the gasification process, or the anaerobic digestion process would imply a drop in calorific value or quality of soil conditioner respectively. The calorific value of the unsorted plastics in the gasification plant is clearly a matter for further debate.
- FoE are keen advocates of the precautionary principle with relation to the emissions of dioxins as they suggest there are no conclusively proven safe levels. Thus, any potential dioxin emissions from the proposed plant could be classed by FoE as 'avoidable' dioxins..
- With regard to waste to energy schemes, FoE argues that as 'recycled goods take less energy to produce than extraction of and manufacture from virgin materials', recycling is preferable to using waste to create energy.¹⁶ They do however acknowledge that this is a more 'acceptable' option for residual waste that could not be either recycled or composted.
- FoE does not support the land filling of ash, particularly fly ash, however use of ash as an aggregate is supported as a more acceptable means of disposal.

¹⁴ Friends of the Earth, *Incineration Campaign Guide*, 1997, p96.

¹⁵ Friends of the Earth, *Incineration Campaign Guide*, 1997, p96.

¹⁶ Friends of the Earth, *Incineration Campaign Guide*, 1997, p96.

Gasification Case Studies

Derby:

A gasification unit has been proposed for Derby, Friends of the Earth campaigned against the proposal. The key objections were location, emissions, demand for waste, failure to follow BPEO guidelines, traffic generation.

The proposed location it was to be situated in the most polluted suburb of Derby in which it was claimed that people already suffered the worst health statistics in the city, highlighting the importance of location and planning consultation in the search for public acceptance. It was also argued that a similar plant operated by the company in Australia had generated rising and unacceptable dioxin emissions. Consequently the organisation concluded that emissions projections put forward by the operators they should not be trusted.

FoE also argued that the plant would depend on 'ever increasing amounts of domestic waste being produced in order to produce profitable syngas'. Further, as recycling and diversion of materials from the waste stream increase, the proposal would rely on increasing amounts of fossil fuel based products to maintain the calorific value of the feedstock or as energy generation through conventional burners.

It was admitted by Derby City Council that they had 'not followed government guidance by exploring other waste management options, and evaluating the best environmental option (BPEO)'.¹⁷ There was also concern regarding the extra traffic that would be generated as a consequence of the new Solid Waste and Energy Recycling Facility (SWERF).

Friends of the Earth proposed that measures such as kerbside recycling collections and composting be properly considered first.

This proposal did not receive planning permission. The implication of this for the WMS is that there could be objections raised to the gasification process and the fact that papers and plastics are not currently due to be recycled. In their campaigning literature gasification process was referred to as incineration an effective tactic in capturing the public interest.

Kent:

The company proposing a SWERF in Derby have since proposed another in Kent that has the support of the council, but is subject to the IPPC and planning processes.

Friends of the Earth also supported the GAIN campaign in Guildford (see below).

Despite all of the above arguments by their own admission FoE are weak on alternative solutions to residual gasification, concentrating primarily on promoting the top end of the waste hierarchy – reduce, reuse and recycle.

Anaerobic Digestion

In their paper entitled *Waste Management Methods*, it was stated that 'Friends of the Earth supports anaerobic digestion for sorted organic waste'. In addition to this, the organisation also supports the use of the gas produced as a fuel for either domestic or industrial use. The

¹⁷ Friends of the Earth Press Release, *Swerve the SWERF*, February 2002.

situation is a little less clear regarding the use of paper and cardboard as an element of the feedstock. In response to questioning there was no clear response to whether this would gain support if it allowed the production of superior grade soil conditioner which would then displace local sales of unsustainably sourced peat compost. They indicated that this was not an area they had considered.

Recycling

As can be seen from the Derby and Guildford campaigns outlined below, Friends of the Earth recommend a kerbside system of recycling to tackle the issue of waste where reducing and reusing have been exhausted as avenues of waste management. Kerb-side recycling is promoted as it avoids pollution from the importing of newsprint and iron ore, as well as this there are avoided externalities arising from the processing of secondary as opposed to primary resources. The net transport related emissions from recycling must also be taken into consideration. However, it seems that there are no arguments here specifically for kerbside recycling and source separation as opposed to the system proposed in this particular waste management scheme. The only argument that seems to be relevant is in terms of job creation, kerbside recycling schemes create more jobs, FoE believes that achieving the government's national target of 30% recycling will create 45,000 jobs.

Landfill

Although not a favoured option landfill, Friends of the Earth cite two arguments in favour of interim use of landfill. As a finite resource it forces more consideration of alternative recycling schemes as it is not an unlimited option. Landfill does not create an ongoing demand for waste.

In summary Friends of the Earth are unlikely to support a proposal that does not have an overarching objective to reduce, reuse and recycle and to provide for the recycling of paper and plastics. Whilst gasification is seen as preferable to incineration, this is only for the estimated 20% of waste that cannot be recycled or composted. Thus it becomes vital to review the proportions of the waste stream to be processed through the gasification plant. The current WMS proposals suggest a figure of 60% whilst the FoW target would be 20%. Whilst there may be some movement on this it is unlikely that there will be an easy agreement between these figures. However careful attention to detailed scheme design to ensure maximum sustainability throughout all the processes may contribute a lot in terms of reducing differences of opinion regarding these figures.

Greenpeace - www.greenpeace.org.uk

Greenpeace argue that that the country is in the middle of a waste crisis. European legislation has 'spelt the end for the polluting and unpopular landfilling', and this in turn has led to a massive increase in planned incinerator capacity. Greenpeace believe incinerators are 'highly polluting and emit several cancer-causing chemicals'. Greenpeace take a strong line on waste issues generally and advocate a 'zero waste' philosophy.

Incineration

On the 21st of March 2001, the Environment, Transport and Regional Affairs Select Committee looked at various issues, including waste issues. Consultation responses submitted by Greenpeace to the committee and work by Greenpeace with other waste experts

has resulted in documents being produced to show how the waste targets can be met without incineration¹⁸. These submissions appear to have had a significant effect on the stance adopted by the committee. An example of one of these is the zero waste section. They believe that waste minimisation should be at the heart of the governments waste strategy and that the government have achieved an awkward and under funded compromise in this area. The views expressed below could be those of either Greenpeace or the Committee.

Perhaps the main issue they had with the waste strategy 2000 was rooted its reliance on incineration. The committee believe that incineration will never play a major role in truly sustainable waste management and cannot, and should not, be classified as producing renewable energy. The same stance is taken for incineration with energy recovery, and even if it does meet the technical definition of renewable energy, it utterly fails to meet what might be called a 'common-sense' interpretation. With the government taking this stance, a signal is sent to the public and business world that it is acceptable to continue producing waste because 'renewable energy' is generated from it. The committee therefore recommended that:

- Incineration with waste recovery to be excluded from counting towards the target of 10% of electricity to be generated from renewable resources
- The Government's exclusion of energy from waste incineration from the Renewable Energy Obligation proposals be maintained
- The exemption of Incineration with waste recovery from the Climate Change Levy be withdrawn

Minimisation, Reuse and Recycling

The committee believes that the government is not taking waste minimisation seriously, and that there are few significant measures aimed at minimising waste. The strategy embraces the current and future growth of municipal waste, rather than challenging it. The committee believes that kerbside collection of source-separated waste is a necessity if waste management is to be transformed. It must be ensured that that Best Value regime works to increase the proportion of households covered by kerbside collections.

Zero Waste

Greenpeace contend that zero waste can solve the current waste crisis. They see a need to break the link between economic growth and creating rubbish and that the current waste policy cannot break this link, but zero waste can., This will be through a mix of producer responsibility, eco-design and disposal taxes, as well as waste reduction, re-use and recycling. For municipal waste, zero waste forces attention onto the whole lifecycle of products. The Greenpeace view is that it involves not just the recycling of materials but the replacement of non-renewable polluting materials with renewable alternatives. They also believe that zero waste requires us to realise the value of our waste by developing new uses for it.

A zero waste policy requires technology to move towards zero consumption and emissions and not towards incineration, which they reason would guarantee 25-30 years of pollution. Greenpeace would like to see a 'smart' system flexible to the needs of the area, locally based which would use the resources contained in household waste as well as generating jobs and wealth for the local economy.

¹⁸ How to comply with the Landfill Directive without incineration: A Greenpeace blueprint. - October 2001.
Source: www.greenpeace.org.uk

They see this being successful by reorganising the household waste management system in four key areas.

1. Organic waste:

There should be separate doorstep collection of organic rubbish – kitchen and garden waste – from all UK households by 2006. The authorities should take this to a network of locally based sealed compost units.

2. Dry Recyclables:

Doorstep collections of dry recyclables should be extended to all UK households and can be collected in one bin, for example: paper, glass, cardboard, plastics, metals and textiles.

3. Bulky and household hazardous Waste:

For example: rubble, wood, electrical goods and paint. Civic amenity sites that are orientated towards disposal should be replaced with a network of re-use and recycling centres. These should be combined with regular doorstep collections of bulky items and garden waste. Bulky items account for 23% of household waste.

4. Management of residual (any remaining waste) through Mechanical and Biological treatment (MBT):

MBT uses sieving, magnets, air streams and electrical currents to remove further metals, plastics and other materials. The largely biodegradable residue is then put in a 'hi-tech' sealed compost unit to break down organic material, which can include paper, textiles and the organic content of nappies. The remaining substance is greatly reduced in weight and volume and can be safely landfilled or used as a daily landfill cover. Edmonton (Canada) employs MBT as part of a large scale recycling programme allowing them to reduce waste by 70%.

Greenpeace see zero waste as an objective that waste policy in the UK desperately needs. They believe that the UK has been 'stuck in the cheapest possible disposal option in the short-term – irrespective of the environmental and human health consequences.' Greenpeace believe there is a stark policy choice. Either stick with the highly polluting incinerator route or follow the 'smart' waste management practise and begin to reap the environmental, social and economic benefits of converting household waste into useful raw materials.

The problems with incineration – A Greenpeace view

- Incinerators do not destroy waste. It is simply turned it into ash, gases and particulate matter. Even though there is less of it, it is breathed in instead.
- Incinerators release a deadly cocktail of chemicals from their chimneystacks, bottom ash and in water discharged to the sewerage system. The heat from the furnace causes many chemical reactions, leading to new toxic chemicals, such as dioxins, polychlorinated biphenyls (PCBs), polychlorinated naphthalene, chlorinated benzene and polyaromatic hydrocarbons (PAHs).
- Incinerator emissions poison the human body. The chemicals that come out of incinerators can cause cancer, heart disease, respiratory problems, immune system defects, increased allergies and birth defects. Dioxins have been classed by the World Health Organisation as carcinogenic, and have been described as the most toxic chemicals known to science.
- Incinerator emissions are poorly regulated. Less than half of the chemicals they produce are continuously monitored. Independent dioxin monitoring occurs no more

than twice a year, and the operators are warned in advance roughly when this will be done.

- Incineration is not 'green'. New incinerators, such as the SELCHP plant in Lewisham call themselves 'combined heat and power stations' and claim to produce 'green energy'. But generating energy from waste in this way is extremely polluting and inefficient. Burning materials that could be recycled and composted to recover a small fraction of the energy embodied in them is in no way green.
- The Government is reacting in blind panic. Pressure to comply with the EU Landfill Directive is forcing both central and local government to embrace incineration as a quick-fix solution – with little regard for impacts on health or the environment.

Greenpeace believe that the UK can 'easily' comply with the Landfill Directive without incineration – by recycling or composting just 30% of household newspaper, card and organic waste by 2010.

Gasification

Greenpeace suggest that there is no more proven advantage to gasification and pyrolysis than 'mass burn' incinerators.

*"Neither of these claims [lower pollution/higher thermal efficiency than incineration] have been substantiated by operating plant. ...Results with municipal waste are not encouraging, for plants of the type or scale applicable to UK municipal waste, However it is clear that gasification has many of the same problems as conventional incineration....Test data and Environment Agency Licences for the pilot projects in the UK and data from plants in other parts of the world reveal the same pollutants released as in conventional incineration and in quantities of the same magnitude. Gasification and pyrolysis are not solutions to the fundamentally dirty and flawed practice of mixing municipal waste and then trying to dispose of it."*¹⁹

Anaerobic digestion

The stance on Anaerobic digestion is less oppositional and more concerned with detail such as relative capital costs per tonne treated compared to home composting. They highlight at length the benefits of home composting for garden waste through small units. They are concerned that contamination in feedstock's for AD processes can result in contaminated residues. They also cite higher capital costs than composting and the fact that emissions are generated from converting the gas to energy.

Anaerobic digestion offers a practical way to treat organic household waste. However, home or community composting is a better option and should be encouraged ahead of anaerobic digestion. The composting process holds onto a much larger proportion of the carbon present in the organic waste and thus less carbon, in the form of carbon dioxide

¹⁹How to comply with the Landfill Directive without incineration: A Greenpeace blueprint. - October 2001.
Source: www.greenpeace.org.uk

and methane, is released into the atmosphere. The retention of organic carbon in the soil is good both for the soil and for plant life.²⁰

Guildford

www.no-incinerator.org.uk

www.surreycc.gov.uk

Thames Waste Management proposed the building of an Integrated Waste Management Centre at the Slyfield Industrial Estate in Guildford. Planning permission was not granted by Surrey County Council for the building of this incinerator. While the project currently under consideration is different in terms of the processes used, the case of Guildford gives an insight into the views and actions of the local people.

In response to the prospect of an incinerator, the Guildford Anti-Incinerator Network (GAIN) was established to challenge the proposed plans. The solution that the GAIN organisation was proposing, and is currently in use in other countries, is

1. Source separation
2. Separate kerbside collections
3. Centralised composting
4. Mechanical Biological Treatment (MBT) to stabilise residual waste which would then be sent to inert landfill
5. Clean the residual waste (hazardous materials left)

GAIN, as an organisation is ultimately in favour of a movement towards zero waste and recently attended a national conference on zero waste. The process outlined above is their proposal for achieving this, from this it can be seen that their main objection to incineration is the creation of a market for waste. The GAIN campaign has continued beyond the refusal of planning permission for the incinerator at the Slyfield site, working to promote reduction, reuse and recycling of waste in the local area.

According to Surrey County Council, planning permission was denied on the basis of the adverse material impact it would have had on the River Wey Corridor, Guildford Town Centre and nearby residential and business properties. It was thought that due to the nature of the design of the proposal it would be detrimental to the visual amenities, recreational use, amenity use, character and environment of the area, causing harm to the Green Belt. Thus, it can be seen that the refusal mentioned nothing specifically regarding the incineration planned for the site, the main objection of the local pressure groups.

However the influence of the local campaign in the outcome of this decision should not be underestimated. The group appear well organised and have both immersed themselves in the networks and arguments of Both Greenpeace and Friends of the Earth and have been supported by them through advocacy and capacity building in advancing their cause. The political head of steam generated has probably also ensured that local political decision makers would be loathe to oppose the campaign wherever possible.

²⁰ Wastewatch – Information Sheet: Anaerobic digestion.

Source:<http://www.wastewatch.org.uk/informtn/efw.htm#background>

Appendix 2 -Semi structured interview summaries

Claire Wilton – National Regional Coordinator/Waste Campaigner; Friends of the Earth
Semi Structured Interview responses to Thameswey Organic Energy (TOE) Proposals

Topic	Responses
Background to group	FoE, represents 100k supporters, 90% of the organisation income comes from individual donations, 207 local groups who have their own separate membership. Local groups attend an AGM which is a general discussion forum but doesn't explicitly set policy for the organisation. Although discussions will influence their strategic five year review process. FoE ltd, a trading company that employs the campaign staff, carries out the main campaigning function of the organisation. Teams work on the broad priority areas identified in the five-year review. Within this process detailed policy activity is chosen within their internal line management structure. The company doesn't have a public AGM process
Aims of Group	"Friends of the Earth inspires solutions to environmental problems which make life better for people" FOE local groups campaign to improve the environment in their own backyard, as well as joining in with campaigns nationally and internationally
Personal Role	Manages the English Regions Team and manages the regional campaigning function. She also coordinates their Waste Campaigns and manages a small team working specifically on waste issues,, including the review of regional waste strategies and the incineration campaigns. The National Group sets the broad policy framework and adumbrates this via the regional officers (who share the national policy positions) to the local groups who do not necessarily share all the national policy positions. Local groups have autonomy on their local stance and take differing views base don local circumstances and the views of their own membership examples of this variance include their stances on zero waste.
Views on national targets	Recycling targets are not long term enough. She believes that recycling levels of 60-80% are achievable and would like to see 50% by 2010. she is currently awaiting the release of more definitive research on this (commissioned by FoE, being conducted by Community Recycling Network,) which will inform an updated policy stance by FoE.
Policy drivers	She would like to see some enabling legislation covering 100% Kerbside collection, with maximum separation at source, public education campaigns to ensure initiatives gain public acceptance and are sustainable; increase in producer responsibility. She accepts that stable developing markets for recyclate are a key barrier and is aware of research government is conducting to tackle this. With regard to charging householders for removal, she felt that a policy stick and carrot combination was needed, and that prior to introducing householder charging full availability to kerbside schemes would be prerequisite to avoid discriminating against the poor.
Best Practice	Few specific examples other than referring to case studies featured by the Community Recycling Network and their Recycling in

	<p>Action report.. She also challenged the Environment Agency baseline assumption of 3%pa increase in volumes. She cited an example in Essex where arising as are actually decreasing following local campaigning. (Further details Paula Witney; 01206 383 122 – local campaigner)</p> <p>She recognised the concerns held by TOE about working conditions within manually operated sorting plants and MRFs. She cited a MRF opened by Margaret Beckett at Pittsea in Essex as an example of high standards.</p>
Zero Waste	In relation to Local Authorities its just an aspirational target. (Bath and North East Somerset district Councils) Much of the philosophy of Zero Waste is outside the sphere of influence for Las as it incorporates the need for complete rethink of producer responsibilities. .
Recycling and alternatives if markets inadequate.	Categorically opposed to incineration. Scepticism and doubts remain over gasification and pyrolysis although less clear in terms of opposition as the scale of these installations are generally smaller scale than incineration plants. The key concern is that the development of alternative technologies to allow recovery and reprocessing could impede to scope for recycling along the lines of the three R's waste hierarchy. Therefore she is not averse to complementary, interim solutions provided reasonable steps are taken to encourage the development of recycling first
Proximity principle	No firm answers in this area. Simply referred back to the generic waste briefing documents already reviewed in the research file.
Anaerobic digestion	Supportive. Had not as yet thought about the implications of allowing use of paper in the anaerobic digestion process with consequent benefits to producing high quality soil conditioner and to offset peat extraction. Was interested in the benefits of this approach but was keen to see an analysis of whether other means could be used to achieve this without losing the value of the paper and cardboard as a recycle stream.
Gasification	<p>Believed there has been a great deal of 'greenwash' about the benefits of gasification by existing operators of gasification plant (e.g. Brightstar) who had sought to obfuscate issues about incineration and gasification. She did also concede that there had been a similar deliberate confusion of terms by NGOs such as Greenpeace as a campaigning tactic. She was happy to highlight differences between the technologies and could be supportive of gasification if it could be proven to be the best option following extensive evaluation and option appraisal. They would also take into account the level of local support for the plant and any associated community heating network.</p> <p>However she was also clear that in future campaigning tactics, FoE would gloss over technological process differences and campaign against a gasification plant as incineration if there was any suggestion that it might be 'crowding out recycling'. .</p>
Organisational Structures	No specific thoughts here, although cited some of the schemes associated with the Community Recycling Network as examples allowing good community participation.

Tom Kenward – Regional Coordinator; Friends of the Earth South East
Semi Structured Interview responses to Thamesway Organic Energy (TOE) Proposals

Topic	Responses
Background to group	FoE, represents 100k supporters, 90% of the organisation income comes from individual donations, 207 local groups who have their own separate membership. Local groups attend an AGM which is a general discussion forum but doesn't explicitly set policy for the organisation. Although discussions will influence their strategic five year review process. The main campaigning function of the organisation is carried out by FoE Ltd, a trading company that employs the campaign staff. Teams work on the broad priority areas identified in the five-year review. Within this process detailed policy activity is chosen within their internal line management structure. The company doesn't have a public AGM process
Aims of Group	"Friends of the Earth inspires solutions to environmental problems which make life better for people" FOE local groups campaign to improve the environment in their own backyard, as well as joining in with campaigns nationally and internationally
Personal Role	Part of the English Regions Team, (Managed by Claire Wilton). Work is planned each year in connection with the English regions programme. The South East office is the only region to have two staff, which means that his role is specifically to work at the grass roots level with the 38 local groups, and a number of specific issue groups.
Views on national targets	AS per the national policy position of the organisation. Personally feels that at some point the strategy will need to embrace the aspirational targets of 'zero waste' within the FoE regional planning process and their stated national strategy as this isn't specifically featured at present. Forthcoming research conducted by the Community Recycling Network and commissioned by FoE will discuss this in greater detail.
	Officially as per the national position. Personal view is also that by setting targets within the middle ground the government have created a problem. The scope of the requirements clearly suggests action is required, yet the targets are too weak to send a strong signal to industry to allow a framework for significant investment, and are in danger of being ignored
Policy drivers	Increase in landfill tax and incineration, legislation for producer responsibility. Also promoting the Private Members 'Recycling Bill? Which has 200MP signatures
Best Practice	Kerbside collection, with three point source separation of ordinary/dry waste and green waste
Zero Waste	A systemic approach, which seeks intervention at the earliest phases of the waste cycle. Clearly it is beyond the scope of many Las within the current environment but believe it is a useful aspirational goal for Las to commit to. (Bath City Council)
Recycling	No fixed positions in this area. He also cited the fact that he thought a number of the NGOs active in this area (incl FoE) had

and alternatives if markets inadequate.	traditionally been strong on lobbying for increased rates of recycling but had failed to adequately address the issues of vulnerability to volatile markets and to provide a hierarchy of acceptable alternatives in the absence of market led recycling solutions. This situation also applies to treatment options for the residual fraction. Landfill is/was still being advocated as the solution. His hope is that the soon to be released FoE/Community Recycling Network research will address this.
Proximity principle	Unclear on exactly where balance should be struck, but recognises that waste miles should be a major influence on the development of best-practice and policy. Consequently he was very interested in the small/local/modular ethos guiding the TOE proposals.
Anaerobic digestion	Strongly supportive.
Gasification	Sceptical but open minded when proposals were set out, particularly the fact that in comparison to incineration proposals are small scale and not likely to displace the market for other recycling activity, i.e. residual treatment only.

Ben Shaw– Green Alliance - <http://www.green-alliance.org.uk/Home.htm>

Semi Structured Interview responses to Thameswey Organic Energy (TOE) Proposals

Topic	Responses
Background to group	The Green Alliance is a small environmental charity employing 10 staff. It has around 450 individual members drawn from academics, business people, environmentalists, as well as writers and artists and around 30 corporate members.
Aims of Group	<p>The Green Alliance mission is “to promote sustainable development by ensuring that the environment is at the heart of decision-making. By working with senior people in government, parliament, business and the environmental movement to encourage new ideas, dialogue and constructive solutions.</p> <p>We have three main aims:</p> <ul style="list-style-type: none"> • to make the environment a central political issue; • to integrate the environment effectively in public policy and decision-making; • to stimulate new thinking and advance the environmental agenda into new areas.
Personal Role	Works specifically on a range of different sustainability issues for the organisation and heads up responses for the group on waste issues.
Views on national targets	Achieving recycling rates set out in the government targets was not ambitious and welcomed the fact that these were statutory, in however reaching diversion rate targets from landfill would be difficult.
Policy drivers	<p>A commitment to increase landfill taxes is needed. Additionally a requirement to pre-treat all materials being sent to landfill including systems to deal with biodegradable wastes. There was a general lack of investment/infrastructure and political will required (to enable the first two) which would allow increasing activity in recycling. He felt government needed to send stronger signals to industry in the form of a stronger policy framework, which would allow for more confidence amongst investors and developers.</p> <p>He wasn’t against the concept of charging householders for waste say £1/bag disposal vs. £0/bag recycle. Some action was needed under recent householder charging suggestions to avoid participating recycling householders subsidising the non-participating ones. Fly tipping was only likely to be a minimal short-term issue.</p>
Best Practice	Examples from Denmark and Massachusetts have demonstrated that high rates are possible, but were unclear on specifics. Cited the

	Hampshire County Council waste Strategy (Contact Bob Bisley at Hampshire CC). A contrasting experience was the Essex County Council strategy, which was opposed and overturned by the District Councils.
Zero Waste	Discussed the aspirational nature of this approach and that a pragmatic acceptance that some minimal levels of household waste were inevitable but that the UK should be striving to move towards EU levels and the US had a great deal more to do. The difficulty of seeking to evaluate specific reduction/reuse programmes is tackling the inherent difficulty of measuring something that is 'not produced or not thrown away'.
Recycling and alternatives if markets inadequate.	Although some markets remained buoyant he was concerned that there could easily be short term market saturation, although he felt that markets would be flexible and demonstrate rapid growth to accommodate increased supply issues. No clear answers on acceptable alternatives. Generally pretty pragmatic on waste to energy issues and different options for the residual materials provided that the maximum levels of recyclables are already extracted. There were concerns that incineration locked communities into unacceptable volumes of waste production over long periods and that this was not acceptable.
Proximity principle	No specific comments although felt the overriding measure for option appraisal is the overall environmental 'groundprint' of the WMS policy
Anaerobic digestion/ Gasification	No specific stances on AD or residual gasification,. There was a general perception amongst NGOs that high recycling rates, increased householder responsibility and the waste hierarchy was preferable to centralised reprocessing and recovery technologies. However there was also a danger of a 'do nothing' approach in the absence of a perfect solution. Use of plant would need to go hand in hand with a continual programme of public awareness and promotion to get the public continuing to carry out source separation. Was quite enthusiastic about small modular units, which could complement the growth of recyclables markets.
Organisational Structures	No specifics although cited the fact that some waste companies (Shanks) had an advisory board which had input from the public.

Jonathan Dixon – Green Party

Semi Structured Interview responses to Thameswey Organic Energy (TOE) Proposals

Topic	Responses
Background to group	National party sets policies and works with semi autonomous local groups who interpret policy with local circumstances. Membership currently 5500 and 150 local groups, in England and Wales
Aims of Group	To promote sustainable development through political activities
Personal Role	Policy Development Coordinator
Views on national targets	60% domestic waste to be recycled by 2007, with Landfill tax diverted to expand recycling schemes, and landfill and incineration to be eventually phased out, (no timescale) would oppose any new incineration plants Limitations the lack of strategies to reduce material usage generally, packaging standards for use of recycled materials, re-establish deposit schemes for reusable materials
Policy drivers	Keen to phase out incineration and landfill but would campaign against achieving one at the expense of the other.
Best Practice	Not official policy but was impressed by some activities he witnessed in Poland where plastic packaging was standardised to allow reuse, for example standardised bottles, and the Irish example of the bag tax at 10p/bag had resulted in a massive instant reduction in packaging volumes. He also felt that as manufacturers products became increasingly similar, there was an effort to achieve differentiation through additional packaging. 100% kerbside collection as a minimum but no details of specific local authorities.
Zero Waste	Endorsed by Green Party, but no specifics
Recycling and alternatives if markets inadequate.	Don't want materials dumped or burnt but no further specific ideas, on alternatives. Benchmark measure be the amount of energy required for conversion as opposed to that realised in the conversion. Architects and Engineers for Social Responsibility. Produced a briefing paper on waste and alternative end use strategies. (Contact: Tony White: 01639 639 785)
Proximity principle	Keen on the waste hierarchy to encourage local responsibility and the linkages between people and the waste they produce.
Anaerobic digestion	Keen on the anaerobic digestion proposals, although not sure on specifics.
Gasification	The holistic approach of the proposals sounds good in terms of avoiding incineration and landfill but, felt gasification presented similar issues to incineration and was generally cautious on it but felt not technically able to pass comment in any detail. Had heard

	that although less emission the technology was still relatively new and would need to pursue a precautionary approach.
Organisational Structures	No examples given.

Tim Brown – National Society for Clean Air

Semi Structured Interview responses to Thameswey Organic Energy (TOE) Proposals

Topic	Responses
Background to group	An environmental Charity, which undertakes work on a range of environmental protection issues with the emphasis on air pollution but also waste and energy issues.
Aims of Group	
Personal Role	
Recycling and alternatives if markets inadequate.	Believes that Greenpeace and FoE have a basic political agenda, which is that there is not enough recycling and therefore nothing should be considered (thermal treatment) which could hinder this. NSCA take a more pragmatic view and that there are many elements of the waste stream which it would be “environmentally foolish” to recycle as the process would consume more energy than would be saved by recycling, and there is a point at which it makes more sense to recover the heat instead. The overall approach described in the Woking WMS makes a lot of sense and would be very much the type of initiative they would support..
Proximity principle	Very keen on the idea of overall minimisation of environmental impact. And as an organisation is strongly supportive of smaller decentralised plant. Additionally was aware that Woking had a “very good record” on energy management generally and carbon reduction so was sure that the proposals would be a useful complement. The proximity principle was also a vital consideration in terms of environmental protection issues. For example NSCA had also undertaken some work, which suggested that it was poor practice to recycle paper and card if this involved transporting it any significant distance. NSCA experience was that Local authorities were frequently trying to ‘do the right thing’ in terms of minimising waste miles and considering options other than recycling but that they would frequently run into opposition from FoE and Greenpeace who would initiate local campaigns frequently using health issues (unnecessarily) as a campaigning tactic.
Anaerobic digestion	Jury is still out on aggregate effect of home composting as opposed to centralised plant, some new research is underway which will provide further analysis of the competing arguments regarding bio-aerosols and pathogen production. However he felt that health arguments (in many cases unsubstantiated) had been whipped up by both FoE and Greenpeace over composting (and thermal treatment) to augment their arguments on recycling.
Gasification	Shares other NGO concerns about larger plant creating a demand for waste but small units seem sensible. Concerns Not oppositional but cautious as a relatively new technology and emissions performance await confirmation. However he felt that the responsibility

	for environmental protection was Environment Agency regulatory and licensing regime was capable of handling this and that although not enormous differences in emissions performance between the thermal treatment technologies
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Jo Papaniski – Eunomia Research and Consulting

Semi Structured Interview responses to Thamesway Organic Energy (TOE) Proposals

Topic	Responses
Background to group	Commercial consultancy on behalf of Waste Collection/Disposal authorities.
Aims of Group	Seeking to develop detailed policy proposals and strategic advice to clients that will assist with sustainable waste management
Personal Role	Until about a year ago worked for Community Recycling Network, now carries out research and consultancy for authorities on Waste Management Strategies. He also undertook the recent research on behalf of Friends of the Earth and Community Recycling Network
Policy drivers	Believes the current legislative environment will tighten rapidly but at present isn't sufficiently strong to enable voter support for initiatives such as the WMS.
Best Practice	Source separation of kitchen waste/organics prior to transport to avoid chemical reactions and build up of heavy metals within organic streams. A dual stream composting/digestion process (modular), which will allow for processing of high quality organic material (that separated at source) and material retrieved as a consequence of the sorting/dewasting process.
Zero Waste	Good aspirational argument
Recycling and alternatives if markets inadequate.	
Proximity principle	
Anaerobic digestion	
Gasification	Not yet a mature technology particularly with variable feedstock's such as that provided in municipal waste.

Climate Change Strategy - Outline Promotional Action Plan

Year --> Month --> Action V	2002												2003													
	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Climate Change Strategy																										
Executive Recommendation to Council																										
Council Approval																										
Announce Strategy - Press Launch etc.																										
Formulate Brand, Promotion Material and Campaign																										
Develop Waste Prevention Promotional Material																										
Develop Alternative Fuels Promotional Material																										
Launch Strategy & Brand																										
Hold Conference on Climate Change																										
Promote to Schools																										
Promote Alternative Fuels																										

Climate Change Strategy - Outline Promotional Action Plan

Year -->	2003												
	Month -->	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Month -->	Nov	Dec											
Action V													
Waste Management Strategy													
Executive Recommendation to Council													
Council Approval													
Develop Information Material													
Undertake Focus Groups & Citizen's Panel Consultations													
Undertake Peer Group Consultations													
Prepare Feedback Report for Executive													
Executive Consider Outcome of Consultation													
Executive Recommend to Council - Full Feasibility Study													
Undertake Full Feasibility Study													
Undertake detailed analysis of waste													
Seek Planning Permission													
Seek IPPC and other consents													
Identify alternative locations for existing depot users													
Prepare Feedback report for Executive													
Executive considers Feasibility and Recommends to Council													
Council approves Project proposal													
Depot Relocation													
Thamesway & Partners Implements Project													

Climate Change Strategy - Outline Promotional Action Plan

Year --> Month --> Action V	2002												2003													
	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Waste Collection Revised Service																										
Executive Recommendation to Council re Pilot																										
Council Approve Pilot																										
Place OJEC Advertisement																										
Select Partner																										
Develop Action plan and Promotional Material																										
Publicise Pilot																										
Undertake Pilot																										
Executive Consider Performance of Pilot - Recommend to Council																										
Council Approve moving to full revised service																										
Implementation of New Service (Phased round by round during 2003/04)																										

Climate Change Strategy - Outline Promotional Action Plan

Year --> Month --> Action V	2004											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Climate Change Strategy												
Executive Recommendation to Council												
Council Approval												
Announce Strategy - Press Launch etc.												
Formulate Brand, Promotion Material and Campaign												
Develop Waste Prevention Promotional Material												
Develop Alternative Fuels Promotional Material												
Launch Strategy & Brand												
Hold Conference on Climate Change												
Promote to Schools												
Promote Alternative Fuels												

Climate Change Strategy - Outline Promotional Action Plan

Year → Month --> Action ↓	2004	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Waste Management Strategy													
Executive Recommendation to Council													
Council Approval													
Develop Information Material													
Undertake Focus Groups & Citizen's Panel Consultations													
Undertake Peer Group Consultations													
Prepare Feedback Report for Executive													
Executive Consider Outcome of Consultation													
Executive Recommend to Council - Full Feasibility Study													
Undertake Full Feasibility Study													
Undertake detailed analysis of waste													
Seek Planning Permission													
Seek IPCC and other consents													
Identify alternative locations for existing depot users													
Prepare Feedback report for Executive													
Executive considers Feasibility and Recommends to Council													
Council approves Project proposal													
Depot Relocation													
Thamesway & Partners implements Project													

Climate Change Strategy - Outline Promotional Action Plan

Year --> Month --> Action V	2004											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Waste Collection Revised Service Executive Recommendation to Council re Pilot Council Approve Pilot Place OJEC Advertisement Select Partner Develop Action plan and Promotional Material Publicise Pilot Undertake Pilot Executive Consider Performance of Pilot - Recommend to Council Council Approve moving to full revised service Implementation of New Service (Phased round by round during 2003/04)												

Climate Change Strategy - Outline Promotional Action Plan

Year --> Month --> Action V	2005											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Climate Change Strategy Executive Recommendation to Council Council Approval Announce Strategy - Press Launch etc. Formulate Brand, Promotion Material and Campaign Develop Waste Prevention Promotional Material Develop Alternative Fuels Promotional Material Launch Strategy & Brand Hold Conference on Climate Change Promote to Schools Promote Alternative Fuels												

Climate Change Strategy - Outline Promotional Action Plan

Year --> Month --> Action V	2005											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Waste Management Strategy												
Executive Recommendation to Council												
Council Approval												
Develop Information Material												
Undertake Focus Groups & Citizen's Panel Consultations												
Undertake Peer Group Consultations												
Prepare Feedback Report for Executive												
Executive Consider Outcome of Consultation												
Executive Recommend to Council - Full Feasibility Study												
Undertake Full Feasibility Study												
Undertake detailed analysis of waste												
Seek Planning Permission												
Seek IPPC and other consents												
Identify alternative locations for existing depot users												
Prepare Feedback report for Executive												
Executive considers Feasibility and Recommends to Council												
Council approves Project proposal												
Depot Relocation												
Thamesway & Partners Implements Project												

Climate Change Strategy - Outline Promotional Action Plan

Year --> Month --> Action V	2005											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
<p>Waste Collection Revised Service</p> <p>Executive Recommendation to Council re Pilot</p> <p>Council Approve Pilot</p> <p>Place OJEC Advertisement</p> <p>Select Partner</p> <p>Develop Action plan and Promotional Material</p> <p>Publicise Pilot</p> <p>Undertake Pilot</p> <p>Executive Consider Performance of Pilot - Recommend to Council</p> <p>Council Approve moving to full revised service</p> <p>Implementation of New Service (Phased round by round during 2003/04)</p>												

Climate Change Strategy - Outline Promotional Action Plan

Year --> Month --> Action V	2006											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Climate Change Strategy Executive Recommendation to Council Council Approval Announce Strategy - Press Launch etc. Formulate Brand, Promotion Material and Campaign Develop Waste Prevention Promotional Material Develop Alternative Fuels Promotional Material Launch Strategy & Brand Hold Conference on Climate Change Promote to Schools Promote Alternative Fuels												

Climate Change Strategy - Outline Promotional Action Plan

Year --> Month --> Action V	2006											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Waste Management Strategy												
Executive Recommendation to Council												
Council Approval												
Develop Information Material												
Undertake Focus Groups & Citizen's Panel Consultations												
Undertake Peer Group Consultations												
Prepare Feedback Report for Executive												
Executive Consider Outcome of Consultation												
Executive Recommend to Council - Full Feasibility Study												
Undertake Full Feasibility Study												
Undertake detailed analysis of waste												
Seek Planning Permission												
Seek IPPC and other consents												
Identify alternative locations for existing depot users												
Prepare Feedback report for Executive												
Executive considers Feasibility and Recommends to Council												
Council approves Project proposal												
Depot Relocation												
Thamesway & Partners Implements Project												

Climate Change Strategy - Outline Promotional Action Plan

Year --> Month --> Action V	2006											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Waste Collection Revised Service Executive Recommendation to Council re Pilot Council Approve Pilot Place OJEC Advertisement Select Partner Develop Action plan and Promotional Material Publicise Pilot Undertake Pilot Executive Consider Performance of Pilot - Recommend to Council Council Approve moving to full revised service Implementation of New Service (Phased round by round during 2003/04)												