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Greenpeace submission to the PIU review of the Governments waste strategy

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1. The need for change

Greenpeace believes that the Government's "Waste Strategy 2000" is not achieving its desired outcome either in terms of quality ("more sustainable waste management") or quantity (maximising the amount of waste recycled and reducing the quantity of waste produced).

Although mandatory recycling targets are beginning to encourage better collection methods and increased recycling of some materials in some areas, the strategy as it stands is unlikely to achieve more than very moderate gains.

This is because of clear policy shortcomings, particularly a lack of incentives for local authorities to avoid waste disposal altogether, incentives for some forms of disposal (particularly incineration under the guise of "energy recovery") and extreme ambiguity from the Government regarding best practice.

The fact that best practice may vary regionally has become an excuse for confused guidelines and mixed messages. A primary cause of confusion is the inclusion of energy recovery with recycling and composting at the same level of the waste hierarchy (Part 1 p. 42, part 2 p.29, p.64). This hierarchy is qualified with a weak and ambiguous statement that "the Government…do not expect incineration with energy recovery to be considered before the opportunities for recycling and composting have been explored" (part 1 p. 42). However the very existence of waste recovery targets where "recovery" includes energy recovered from waste incineration, is encouraging increased incineration.

Measures needed are:

- Modification of the waste hierarchy so that mixed waste disposal options are at the same level at the bottom of the hierarchy (i.e. incineration with energy recovery and landfill of mixed waste would occupy the bottom level).
- An end to "recovery" targets which include energy from waste incineration.
- An end to subsidies and incentives for incineration, including;
    - an end to their entitlement to issue packaging recovery notes
    - an end to their exemption from the climate change levy
    - retrospective removal of entitlement to NFFO subsidies (many incinerator applications were awarded NFFO contracts in or before 1998 and will still be eligible if they are built)
- Introduction of a disposal tax, which includes energy-from-waste incineration, to replace the landfill tax, so that waste is not pushed from one disposal option (landfill) to another (incineration).

2. Greenpeace proposal for a new UK waste policy

Greenpeace believes there is a waste management model flexible enough to be adapted to both rural and urban, affluent and deprived areas, that can enable the UK to reach greatly improved short and long term goals. The model delineates a route to qualitatively change the way we deal with waste and importantly, addresses waste generation.

This model is detailed in the two enclosed Greenpeace documents "How to comply with the landfill directive without incineration" and "Zero Waste. The central elements are:

Short term:

- Maximum source separation and kerbside collection of waste for recycling
- Kerbside collection and composting of kitchen waste
- Mechanical Biological Treatment of residual waste
- Further recycling uses for mechanically sorted material
- Landfill/quarry backfill/brownfield site remediation use of stabilised organic residue (depending on level of contamination)

Other regions in the world have diverted up to 70% of domestic waste from landfill using these techniques. Canadian cities and provinces are probably the world leaders and the waste management systems in Edmonton, Alberta and Halifax, Nova Scotia are particularly worthy of detailed examination as potential best practice models.[1] These systems would enable the UK to set achievable targets of 50% diversion from disposal (incineration or landfill) by 2007 and 70% by 2010.

These targets are to a great extent dependent on high rates of composting. In many regions kitchen and garden waste comprise 40% of the municipal stream. Utilisation of the resulting compost is essential and this will require a) maximum source separation and b) clear regulations regarding quality, contamination and end use. Ultimately, for a sustainable waste strategy, the organic matter in kitchen and garden waste must be returned to the earth to re-enter the natural carbon cycle, rather than be disposed of by burning.

Measures needed are:

- Mandatory separation of kitchen and garden waste from the dustbin stream by householders and mandatory separate collection and composting of these materials by local authorities.
- Immediate implementation, without waiting for the European legislation, of the standards and proposals for composting of food wastes in the draft European regulations on the Biological Treatment of Biowaste.
- A flexible treatment option for residual waste that reduces pollution and does not perpetuate the need for waste disposal. Greenpeace believes Mechanical Biological Treatment is the only currently available technology capable of satisfying these criteria.
- A distinction between landfill of cleansed and stabilised material (from eg biological treatment plants) and landfill of mixed, untreated municipal waste. Landfill of stabilised waste should be above energy from waste incineration and landfill of mixed waste in the waste hierarchy.
- Incentives for householders and waste collection authorities to achieve maximum possible separation and collection of recyclable materials. Such incentives may include direct charging for residual household waste.

Greenpeace believes these measures, together with the kind of innovative collection techniques described in the "Greenpeace Blueprint" (enclosed), when used in conjunction with a determined and professional marketing strategy for collected materials, can achieve a stable 70% rate of diversion from disposal. Edmonton, Canada achieved such a rate in a period of about five years. This would enable the UK's commitments under

[1] Edmonton and Halifax operate different systems, notably Edmonton does not separate kitchen waste at source. Greenpeace recommends maximum separation of kitchen waste at source to obtain a clean compost product. However the Edmonton model may be favoured in certain circumstances prevailing in some parts of the UK.

the Landfill Directive to be met with ease while laying the ground for further long-term progress.

Long term:
The long term objective should be zero waste and UK waste policy should be based on a strategy to achieve zero waste.

The premise upon which Zero Waste is based is that human systems can be designed emulate natural systems in which waste is virtually zero. The strategy on which a Zero Waste policy should be built is the premise that all material that cannot be re-used, recycled or composted becomes the responsibility of the individual producer (manufacturer) or importer, who must bear the full cost of its collection and safe disposal. When implemented correctly this kind producer responsibility legislation can provide the necessary economic incentive for producers to re-design processes and products to eliminate waste. A zero waste objective therefore not only encompasses policies for maximum recycling and composting, but also addresses waste minimisation in a systematic way. It is the mechanism by which the link between economic growth and waste generation can be broken.

Measures needed are:

- A strong policy lead from the Government, setting zero waste by 2020 as the objective.
- A lead from the UK Government in initiating individual producer responsibility legislation at EU level, to cover all processes, products and packaging.
- Government implementation of producer responsibility legislation (eg Packaging Directive, WEEE Directive, directives on fridges, tyres, batteries etc) in such a way that it leads to a reduction in waste generation. Individual producer responsibility is necessary to achieve this.
- Transitional finance and transformation of the current structure of incentives, to one which favours non-disposal options, as outlined in 'Zero Waste' (enclosed, see particularly chapter IX)

Some technologies are more appropriate to achieving the above objectives than others. Incineration is an impediment to both the short term goal of maximising recycling and the long term goal of Zero Waste because of the structural need for waste-as-fuel it initiates.

Mechanical Biological Treatment (MBT) on the other hand is much more flexible and can aid both the short and long term goals. It does this firstly by capturing more recyclable material that has escaped source separation (thereby maximising recycling) and secondly by its flexibility with regard to organic matter. Compost from source separated material generally commands a much higher price than material from mixed waste. The economic incentive coupled with the technological capability of converting MBT modules from "grey" to clean composting therefore remains as a driver.

It is absolutely central to the working of such a system that incineration of waste is not an option for waste authorities. Greenpeace's main objection to incineration is the widespread pollution caused by emissions of stack gases and disposal of ash and residues. However, the fact that incinerators undermine progress towards waste systems that seek to minimise and eliminate waste, is an additional factor. Incinerators are firmly a waste disposal technology. Their existence makes a minimum level of waste disposal a necessity for 25 to 30 years after construction.

3. The need to exclude the incineration option from the UK's waste strategy

Incinerators transform materials into gases, small particles and ash and distribute these over a wide area. Gases and dust particles are dispersed more or less randomly in the atmosphere, ash is dispersed in a more or less contained way, bound only temporarily, in construction aggregates or contained, again only in the short term, in landfill sites. (Despite a 1999 Government statement that "incinerator wastes are not suitable for use in road works in their unbound state"[2] according to a recent Environment Agency report most incinerator ash not landfilled is used in unbound applications.[3])

Operators argue that emissions and releases do not lead to concentrations that cause damage to human health or the environment. However, these pollutants are re-concentrated by nature and can bioaccumulate to harmful levels. Moreover there is evidence that incinerators do have a direct impact on human health and the environment. At root Greenpeace believes it is fundamentally wrong to disperse hazardous (toxic, persistent or bioaccumulative) substances into the environment in cases like incineration where there are readily available, practical alternatives.

Incineration should therefore be excluded from waste management options on the basis of:

- **The objective of sustainable waste management**. Waste management cannot be sustainable if it leads to systematic pollution of the air, soil or water, if it destroys potential resources, demands continued waste generation or pre-empt other, more sustainable techniques.

- **The precautionary principle – elimination of emissions of hazardous substances**. Emissions and releases of hazardous substances (bioaccumulative, persistent, carcinogenic, mutagenic or reproductive toxins) should be eliminated. Current waste management policy, which relies on dilute and disperse pollution management and risk based regulation, does not minimise exposure to these chemicals and does not take us towards eliminating them from the environment. Incineration demands toleration of certain "acceptable" levels of hazardous pollutants. A more progressive approach is to aim for the elimination of hazardous pollutants from the environment and to implement policy accordingly. Incinerators create new hazardous materials as well as dispersing many of those already present in waste and should be replaced by waste management techniques that do neither of these.

- **The precautionary principle - Inadequacy of risk assessment**. Epidemiological methods are not currently adequate to determine the health impacts of emissions and releases from incinerators. There are gaps in both the data and techniques used to assess risk. (eg. small sample populations size, potential synergisms in the combined effects of chemicals to which people are exposed, the long periods necessary for health effects to become manifest, impacts manifest via the food chain rather than via inhalation, possible effects of small increments in exposure to unusually susceptible people, effects of fugitive emissions and short-term increases due to abnormal operation, effects of substances not measured or reported (eg brominated dioxins,

2 Parliamentary Answer (12 Jul 1999 : Column: 20): Ms Glenda Jackson: Research carried out in 1993 for the Department of Transport looked into the chemical content of bottom ash from the incineration of municipal waste and its possible use in road construction. This concluded that due to the high concentration of soluble metals (eg. lead, zinc and arsenic) and sulphates, incinerator wastes are not suitable for use in road works in their unbound state.

3 Environment Agency, May 2002. Solid residues from municipal waste incinerators in England and Wales.

PCB's), effects of compounds not characterised, uncertainty of 'safe' levels of many hazardous substances).

- **International conventions**. The UK is a signatory state to both the OSPAR Convention on the Protection of the North East Atlantic and the United Nations Stockholm Convention (UNEP Convention on Persistent Organic Pollutants). Both of these require continuing reduction of dioxins and other hazardous substances with the goal of their eventual elimination. Increasing incineration capacity contradicts the objectives of these conventions.

- **Inadequate licencing requirements**. The collective impacts of many new incineration facilities are not considered in the current plant-by-plant planning and authorisation process. Local impacts only (generally within a few kilometres) are considered. Potential national and international effects are ignored.

- **Impediment to recycling**. Incineration reduces the incentive to recycle and places a cap on recycling and minimisation levels. This argument has been made by the Environment Committee,[4] the DTI[5] and many others.

- **Inflexibility**. Construction of incinerators requires the quantity and composition of the waste stream to be predicted many years in advance. It restricts changes in that stream for the lifetime of the incinerator. For example, removing too much green waste for composting can result in the calorific value of the remaining waste being too high for a conventional incinerator. Such problems are ongoing in Amsterdam and Rotterdam.

- **Destruction of resources***.* The energy captured from incineration is a small fraction of energy saved by recycling.[6] Incineration is a destruction technology that disperses materials very widely, with the result that production, consumption and disposal remains linear and unsustainable.

- **Jobs***.* Waste management strategies based on recycling, composting and MBT create many more, better quality jobs and command much greater public support than programs that include incineration.[7]

4. Health impacts of waste incineration.

The DETR Environment Committee stated that; "the health effects which result from an incinerator's emissions are not yet fully known."[8] This in itself is a strong reason to exclude incineration from waste management options. However, experimental data confirm that incinerators release a wide range of toxic substances and that humans are exposed as a result. Studies on impacts of incinerators on workers and nearby populations give cause for concern, particularly when the limitations of epidemiology in detecting chronic disease due to industrial pollution is considered. Enclosed is a Greenpeace report, Incineration and Human Health, which draws together scientific findings on releases from incinerators (hazardous and medical waste facilities as well as municipal waste incinerators) and their impacts on human health.

4 Department of Environment Transport and Regional Affairs Committee, March 2001, report HC 39-I, Delivering Sustainable Waste Management

5 Decision letter on refusal to grant consent to extend the Edmonton incinerator 23 May 2002

6 See for example, Re-inventing Waste; Towards a London Waste Strategy, London Planning Advisory Committee/Environment Agency/Ecologica 1998. Creating Wealth from Waste, Robin Murray, Demos 1999

7 See Creating Wealth from Waste, Robin Murray, Demos

8 Department of Environment Transport and Regional Affairs Committee, March 2001, report HC 39-I, Delivering Sustainable Waste Management, Vol 1 paragraphs 97/98

Published shortly after the Greenpeace report, a study in The Lancet (enclosed) found that children living near waste incinerators matured sexually at a later age and boys tended to have smaller testicles than the control group. The study concluded "our findings suggest that present environmental standards are insufficient to avoid measurable biological effects, which might cause disorders in later life".

Also enclosed is a paper by Dr C.V. Howard, of Liverpool University Infant and Foetal Pathology Unit, on the health effects of incinerators with particular reference to dust particles.

Notwithstanding the growing body of evidence indicating direct impacts of incinerators on the health of populations living in their immediate vicinity, it is likely that the major threat to human health from incinerators comes from persistent pollutants which find their way into the food chain.

The Food Standards Agency notes that "the main risk to the safety of the human food chain will be through deposition of persistent contaminants in areas of food cultivation."[9] They continue "even a well-operated modern incinerator that meets emission limits defined in the Waste Incineration Directive will add to the overall burden of persistent pollutants such as dioxins in the environment."

Dioxins serve as an example because although limited, there is at least some data available on their environmental fate, toxic effects and emission levels. In a recent Parliamentary Answer, the Environment Minister Michael Meacher confirmed that the 1.1g of dioxin air emissions reported by MSW incinerator operators for the year 2000 represents enough to supply 6,875 million Tolerable Daily Intakes (using the COT recommended maximum TDI of 2pg/kg body weight per day) (PQ enclosed). A similar calculation shows that the SELCHP incinerator, often cited by the waste industry as one of the most modern and best operated plants in the country, emitted enough dioxin to supply over 1 million TDIs every day.[10] This calculation is intended to illustrate that dioxin emissions from the most modern incinerators are very significant, not that 1 million people will actually receive their maximum tolerable daily dose from a nearby incinerator, or that all dioxin emitted to air will be ingested by human beings.

Because dioxins are very persistent in the environment a significant proportion of this material is likely, sooner or later, to find its way into the food chain. Average current daily intake of dioxin in the UK is very close to the 2pg limit, at 1.8pg (see PQ) and COT state that 30% of the UK population and 50% of small children currently exceed the TDI for dioxin intake.[11] The WHO and the USEPA have stated that these sort of dioxin intake levels are probably already having an adverse impact on human health.[12]

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[9] FSA response to the application for a permit for a new incinerator at Chineham, Basingstoke, 14 Nov 2001, (SI 2000, No 1973)

[10] From measurements done on behalf of EA 9th – 11th Nov 1999
Gas emissions 80 m^3/s (2 units, 40m^3 each unit), Measured dioxin = 0.0219ng/m3, = 1.752ng /second = 1.752x(60x60x24) = 151 372.8 ng/day = 151 372 800pg/day
COT maximum dose is 140 pg/day
151 372 800/140 = 1 081 234 maximum doses.
NB Greenpeace believes actual dioxin emissions may be significantly higher than those reported under the current monitoring and reporting regime.

[11] Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment. Statement on dietary exposure to dioxins and dioxin-like PCB's. COT Statement 2000/03. August 2000 and Food Standards Agency, news release 16th Nov 2001.

[12] WHO paper submitted to the Dioxin 98 conference, reported in ENDS 281 June 1998 p.5

Under these circumstances, every possible measure to reduce emissions of dioxin should be taken. Increased incineration capacity is not compatible with this goal.

It is often argued that levels of emissions of some compounds are lower for incinerators than for some other sources. Greenpeace believes this indicates a need to address those other sources and is not a valid justification for continued, or increased, emissions from incinerators.

It is also sometimes argued that the risks to health associated with incineration are much smaller than many other risks people happily and voluntarily face in their everyday lives. Research shows that people are willing to face risks when they have some degree of control over those risks, when they perceive a benefit from the risk or when the risk is distributed evenly through society. (See enclosed, pp10-13, Health and Safety Executive 2001, Reducing Risks, Protecting People). Many people correctly perceive that none of these criteria apply to the incineration of waste and their intolerance of any risks associated with it, however small they may be in comparison to other risks, is logical and perfectly valid.

Potential health risks from recycling on the other hand are small. Recycling processes certainly have some environmental impacts, but in terms of hazardous emissions and discharges, greenhouse emissions and energy savings, recycling is the best option in the great majority of cases and in general overall net impact of recycling compared to incineration is a positive one.[13] However, some secondary processing is currently responsible for significant emissions – aluminium recycling and iron and steel production (which uses large amounts of reclaimed material as a feedstock) are examples where dioxin emissions are high and better process controls and regulation are urgently needed. However, incineration is not a good treatment option for metals. Metals that are vaporised present a pollution problem, those that are not must either be recycled (providing a poorer quality product than metals recovered before burning) or disposed of in landfills.

Measures needed are:

- A Government waste policy that clearly excludes incineration as an option
- A program to phase out the use of existing incinerators

5. Residual waste

Residual waste should be dealt with in such a way that measured and potential public health and environmental impacts are minimised. Flexibility to accommodate reductions in the quantity and increases in the quality of residual waste should be maximised. Greenpeace believes Mechanical Biological Treatment (MBT) is the best available technology to achieve these ends. The objective of MBT systems is to avoid putting materials containing toxic substances, recyclable material and putrescibles together into any final disposal option where they can interact and contaminate each other. Instead, MBT systems combine a series of treatment steps to remove as much recyclable, organic and toxic material from residual waste as possible, before landfilling the inert, "stabilised" final product. The enclosed reports "How to comply with the Landfill Directive without incineration", and "Zero Waste" give more details of MBT systems.

The use of MBT systems has enabled cities and regions on both sides of the Atlantic to greatly increase their waste diversion rates. Halifax, Nova Scotia's 350,000 people

[13] See for example: DETR: Waste Strategy 2000 Part 2, pp 187- 189; Re-inventing Wast; Towards a London Waste Strategy, London Planning Advisory Committee/Environment Agency/Ecologica 1998, Chapter 4. US EPA 1997, Greenhouse gas emissions from municipal waste management'

boosted their diversion rate to 61% by using a three-stream recycling plus MBT system. The city of Edmonton, Alberta's 900,000 citizens have now reached 70% diversion from landfill.. Neither city uses incineration.

Policies which utilise incineration are now generally justified by predicting maximum levels of recycling and emphasising the need to deal with what is left over. Hence much argument has centred on what maximum recycling levels are. However, accurate predictions of maximum recycling rates are only necessary for planning capital intensive, fixed capacity projects such as incinerators. Mechanical Biological Treatment makes such predictions less important because MBT plants can be designed to cope with changing waste streams.

There are now many three-stream (dry recyclable, compostable, residual) systems operating across Europe, in Germany, Austria, Italy, Flanders and other regions in which MBT is used as the treatment option for residual waste. However, many of these MBT plants use incinerators to dispose of the combustible fraction of their output. This negates the environmental gains offered by MBT and may lock authorities in to a dependency on waste as fuel in the same way conventional incineration does. The need to dispose of plastics, for which there is virtually no recycling market, is the major factor in this trend. Plastics are one of the most problematic materials in incinerators[14] and they should be dealt with by producer responsibility legislation from which "energy recovery" by incineration is firmly excluded is firmly excluded. Other legal measures designed to drastically reduce the quantity of plastics disposed of are also urgently needed.

The intended destination of MBT output will affect plant design. It is important that UK waste policy encourages MBT systems to be designed with the goal of immediately increasing the amount of recyclable material captured and eventually eliminating reliance on disposal. MBT systems designed to "split" waste into a high calorific value fraction suitable for incineration and a low calorific value stream, are not suitable for these goals. They tend to employ shredding of the feedstock and sorting takes place after the biological treatment stage. In the system Greenpeace advocates, sorting and mechanical extraction of recyclables should come before biological treatment. This ensures maximum flexibility and minimum contamination of the stabilised organic material. Initial shredding of the feedstock should also be avoided to minimise cross-contamination.

6. Environmental impacts of Mechanical Biological Treatment

It is not possible to deal with mixed municipal waste in a way that has no environmental impact. However MBT, which mechanically separates residual waste into several streams, and follows this with biological treatment of organic waste to stabilise it and reduce the mass, can greatly reduce releases and emissions compared to both incineration or landfill of mixed municipal waste.

Emissions of hazardous substances

Unfortunately it appears that there are no figures available to enable a comparison of emissions from MBT and incineration on a like-for-like basis. Incinerator emissions are reported post pollution abatement whereas most operating MBT plants do not currently use pollution abatement apart from biofilters. However, even using these figures, data from Europe indicate that emissions from MBT plants are one or two orders of magnitude smaller than for incinerators per tonne of waste treated.

[14] PVC is a major donor of chlorine (necessary for dioxin formation) as well as lead, cadmium, tin and other hazardous compounds. Other plastics may contain brominated fire retardants which can lead to brominated dioxin formation. As plastics are made from oil they must also be considered a fossil fuel CO_2 source.

Another problem is that available figures are inevitably given in concentrations, whereas total load per tonne of waste processed is more important to assess impacts. However, exhaust gas volumes from incineration and biological treatment appear to be of the same order of magnitude (in the region of 5000m^3 per tonne for an incinerator and 3000m^3 per tonne for an MBT plant). Concentrations of pollutants in exhaust gas therefore provide a reasonable basis for comparison albeit probably erring in favour of incinerators.

Dioxin

Data from the Lenzing plant in Austria indicate dioxin levels of $5x10^{-10}$ mg/m^3 in gas emerging from the biofilter.[15] This is two orders of magnitude smaller than levels in post pollution control treatment gases from the best operated incinerators according to operators own figures.[16] Dioxin abatement systems for MBT could reduce air emissions still further. It is likely that dioxin emissions from MBT plant originate from dioxins already present in the waste, as temperatures are not high enough for *de-novo* generation. Incinerators on the other hand are net dioxin generators, synthesising dioxins from chlorine and oxygen present in the waste.[17]

Metals

Table 1 shows data from the Siggerweissen MBT plant in Austria compared to emission concentrations from SELCHP.

	MBT (crude gas emissions), µg/Nm^3	SELCHP post air pollution control, µg/Nm^3
Mercury	0.5 – 3.8	4.4 – 5.9
Lead	0.05 – 0.8	1.1 – 2.0

Table 1. (MBT data from "Mechanisch-Biologische Abfallbehandlung in Europa"; Parey Buchverlag, Berlin. SELCHP data from the IPC Public Register).

This data shows emissions of these metals to be significantly lower for MBT than for incineration even without pollution control on MBT.

In Germany and Austria there is a movement towards regulating emissions from MBT to ensure the highest possible standards, and pollution control is likely to become the norm. Control and regulations are most likely to be applied to non-methane volatile organic compounds, which form the most significant emissions from a biological treatment plant. Crude gas emissions are reported to be in the range 50 – 200 mg/m^3 [18]. It has been recommended that emissions limit values for NMVOCs from MBT will be set at 20mg/m^3, the same as for incinerators.[19] The same report proposes a dust limit of 10mg/m^3 (current incinerator limit 20mg/m^3).

In conclusion, while the data currently available is limited, figures from European plants show much reduced emissions of what are currently considered to be the pollutants that

[15] Uwe Lahl, Barbara Zeschmarr-Lhl and Thomas Angerer (2000) Entwicklungspotentiale der Mechanisch-Biologischen Abfallbehandlung: Eine Okologische Analyse, Monographien Band 125, Wien, June 2000
[16] eg SELCHP report dioxin emissions of 0.02 – 0.03 ng/m^3 ($3x10^{-8}$mg) Compliance monitoring report, Aug/Sept 2000
[17] ENDS Report 273, October 1997
[18] Mechanisch-Biologische Abfallbehandlung in Europa, chapter 9; Parey Buchverlag, Berlin
[19] Mechanisch-Biologische Abfallbehandlung in Europa, chapter 9; Parey Buchverlag, Berlin

have the potential to cause the largest health effects: particulate matter, lead, mercury and dioxins.[20]

MBT Residues

Levels of contaminants in the residues from MBT plants will be dependent on levels in the waste entering the plant, which will in turn depend on source separation achieved and the efficiency with which hazardous products and materials are removed before processing.

According to the European Commission, experimental results show that highly stabilised MBT reduces the landfill gas emissions potential by 90% compared with untreated MSW and that it is likely any methane released will be fully oxidised in the soil.[21]

The extent to which MBT residue is stabilised depends on the composting process and the length of any maturation period allowed. Levels of stabilisation required under current Austrian and Italian standards are achieved in 40 to 60 days,[22] but the highest levels of stabilisation can take considerably longer.

The EC also reports that because MBT residues can be compacted to a very high density in landfills (ca 1.5 tonnes/m^3), leachate production is minimised and the total nitrogen and total carbon content of leachate is reduced by 95% and 80 – 90% respectively. This high density further reduces the amount of landfill space needed and has several other beneficial effects for landfill management.[23]

Highly stabilised MBT residue, depending on levels of contaminants, may be suitable as a backfill material for worked out quarries and has the potential to help solve the current industry problem of the shortage of inert material available for this purpose.

7. Costs of MBT

Data for the Siggerweissen plant in Austria, which processes 100 000 tonnes of waste per annum, indicate a capital investment of €10 million and net treatment costs of €65/ tonne of waste input.

Further cost and emissions data are available in Mechanical-Biologische Abfallbehandlung in Europa (German only) published by Parey Buchverlag, Berlin.

Measures needed to stimulate uptake of MBT are:

- A requirement by central government for local authorities to consider MBT, incorporating aerobic or anaerobic treatment of residual biodegradable material, as a technique for dealing with, and minimising residual waste.
- Legal standards that define the degree of stabilisation necessary before biological waste can be classed as inert.
- Standards detailing the levels and types of contamination to be permitted in biologically treated waste for particular uses (e.g. quarry backfill, brownfield site remediation, landfill cover)
- Legislation to reduce the amount of plastic waste needing disposal.

[20] US National Research Council 2000: Waste Incineration and Public Health p.6.
[21] European Commission 2001. Waste Management Options and Climate Change P 126
[22] ibid.
[23] ibid.

8. Conclusion

The UK currently lags far behind the world leaders in waste management techniques. A step change in waste management policy is needed to change this situation. Such a change needs to set in motion a process that transforms the objective of waste management strategies from a preoccupation with disposal options, to a quest for high added-value resource utilisation.

The overarching goal necessary to drive such a change is zero waste and a coherent Zero Waste policy would provide the political framework necessary to achieve the desired transformation.

Achieving zero waste requires a series of steps, each of which acts as a platform or springboard from which progress towards the next stage begins. Kerbside collection of the full range of recyclable materials, composting of all kitchen and garden waste and mechanical biological treatment of "temporary residuals" are the first, necessary, steps.

Incinerators, instead of providing such a springboard, impede progress, stifle innovation and destroy incentives to strive for zero waste. They do this, even as part of an "integrated waste strategy", because the capital investment they embody, the feedstock they need and the long term stability of waste composition they require, place a real and inflexible cap on minimisation, re-use and recycling. While they do all this, they systematically disperse very hazardous, very persistent, substances, slowly but surely, into the environment. A significant quantity of these substances will find their way, sooner or later, into human beings.

For these reasons, mechanical separation, stabilisation and landfill of residual material is a much better environmental option than incineration with energy recovery and the current waste hierarchy needs to be changed to reflect this.

The technology and techniques with which the UK can achieve 70% recycling in the short term and zero waste by 2020 are currently available and in use in other parts of the world. The public desire to recycle is very high despite the feeble example that has been set by waste authorities and the lack of leadership from central government. Current waste policy seeks only relatively marginal improvements in recycling, offers nothing to address minimisation and completely ignores the real challenge of "sustainable waste management", which should seek to end our dependence on ever more complex technologies that aspire to "dispose" of ever increasing amounts of waste.

What is now needed is an ambitious, imaginative and determined policy that aims to make the UK a world leader in waste minimisation and utilisation. Some of the techniques and technologies that are available to serve this purpose are outlined in the enclosed document "How to comply with the Landfill Directive without incineration: A Greenpeace blueprint". The policy framework, measures and some possible structures and finance to take us beyond 70% are detailed in "Zero Waste", also enclosed.

Greenpeace urges that these ideas are utilised to generate a radically new waste policy, which instead of being a reaction to external directives and imperatives, is driven by environmental considerations and takes heed of how communities actually want to deal with their waste.