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Waste Incineration

Implementation of the EU Landfill Directive has resulted in the need to reduce waste production and find new ways of waste disposal. One of the favoured options is incineration with energy recovery. However, this is a controversial issue and there is opposition to the use of incineration as a form of waste disposal generally and, at a local level, the siting of incinerators in particular. This paper covers many of the issues relating to municipal solid waste incineration.

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Summary of main points

- The UK produces over 400 million tonnes of waste every year. Of this, 28 million tonnes is municipal solid waste (MSW), most of which is disposed of to landfill. As a result of the Landfill Directive new ways of dealing with MSW are needed to reduce the level of waste being taken to landfill. Incineration is one of the options available.
- Emissions from municipal waste incinerators have been greatly reduced in the last ten years. They will be further reduced over the next few years as a result of the implementation of the Incineration Directive.
- There are general concerns amongst the general public about the safety of incineration and the possibility of health problems associated with emissions. Dioxins are of particular concern. In addition, incineration is seen by some, especially environmental groups, as an inefficient use of resources. The Government and many in the waste industry regard incineration as a safe and necessary part of the Waste Strategy.
- The Government issues planning guidance for waste planning authorities. It also requires waste management strategies to be prepared on a regional and local level. The inclusion of incineration is not prescriptive and it is up to individual authorities to determine the need for new incinerators. Estimates for the number of new incinerators that may need to be built by 2020 vary from 21 to 104.

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I Introduction

The management of waste is becoming an increasingly important issue for modern society. Excessive waste production is an inefficient use of resources and results in a large amount of unwanted material for which a safe means of disposal has to be found.

The latest estimates show that the UK produces around 400 million tonnes of waste annually, of which 29.3 million tonnes was Municipal Solid Waste¹ most of which was disposed off to landfill. Table 1 gives the latest estimates of waste produced in the UK.²

Table 1

Estimated waste production in the UK, by sector

Latest estimates

	Million tonnes	Percentage of total	Date of estimate
Mining & quarrying	118	28%	1997
Agriculture	87	20%	1999
Demolition and construction	72	17%	2000
Industrial	50	12%	1998/99
Dredged material	41	10%	1997
Municipal	30	7%	1999/00
Commercial	25	6%	1998/99
Sewage sludge	1	<1%	1998/99
Total	428		

Note: A number of these estimates are for England and Wales only

Source: *Digest of Environmental Statistics*, DEFRA

Though MSW may seem a small proportion of the total waste produced, recycling levels for municipal waste are often much lower than for other types of waste. For example, about 40% of industrial and commercial waste is recycled or recovered compared to 17% of MSW.³ Recovery, which includes recycling, is the use of waste to replace other materials thereby conserving natural resources. Incineration of waste with energy recovery would be included in this figure.

¹ Municipal Solid Waste includes all waste under the control of local authorities or agents acting on their behalf. It includes all household waste, street litter, waste delivered to council recycling points, municipal parks and garden wastes, council office waste, civic amenity site waste, and some commercial waste from shops and smaller trading estates where local authority waste collection agreements are in place (Waste Strategy 2000)

² DEFRA, *Digest of Environmental Statistics*, December 2001
<http://www.defra.gov.uk/environment/statistics/des/waste/index.htm>

³ DETR, *Waste Strategy 2000: Part 1*, 25 May 2000.
<http://www.environment.detr.gov.uk/waste/strategy/cm4693/index.htm>

a. *The Landfill Directive*

Extensive legislation has been put in place to address the issue of waste management, most of it EU led. The Landfill Directive came into force in 1999, its main aim being to prevent or reduce as far as possible the negative effects of landfilling waste on the environment and human health.⁴ The Directive sets targets for Member States to reduce the amount of their biodegradable municipal waste sent to landfill. Biodegradable waste was focused upon because it is the biodegradable element of waste which breaks down to produce methane, which is a powerful greenhouse gas. In addition, new space available for landfill is limited and this means that ways need to be found both of reducing the amount of all types of waste produced and of disposing of the waste that is produced.

To ensure compliance with the Landfill Directive the Government has set national targets for recycling of MSW and reduction of biodegradable MSW being sent to landfill.⁵ The overall aim is to raise national recycling rates to at least 17% by 2003/04 and at least 25% by 2005/2006 and reduce landfill as follows:

- By 2010 to reduce biodegradable municipal waste landfilled by 25% compared to 1995 levels.
- By 2013 to reduce biodegradable municipal waste landfilled by 50% compared to 1995 levels.
- By 2020 to reduce biodegradable municipal waste landfilled by 65% compared to 1995 levels.

b. *How we currently manage waste*

There are significant differences in the management of MSW across the country. The North West had the highest rate of landfill in England in 2000/01 (94%). The West Midlands had the lowest level of landfill (58%) and the highest percentage of waste incinerated (31%). Rates of recycling/composting varied from 7% to 18%.⁶ National levels are given in Table 2 below.

⁴ Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste, OJL 182 , 16 July 1999, p1-19

⁵ DEFRA, Guidance on Municipal Waste Management Strategic. March 2001
<http://www.defra.gov.uk/environment/waste/management/guidance/mwms/index.htm>

⁶ DEFRA, *Municipal waste management statistics 2000/01*,
<http://www.defra.gov.uk/environment/statistics/des/waste/bulletin/index.htm>

Table 2

Management of Municipal Solid Waste in England, 1996/97 and 2000/01

Method	1996/97		2000/01	
	Thousand tonnes	Percentage of total	Thousand tonnes	Percentage of total
Landfill	20,631	83.9%	22,055	78.3%
Recycled/composted	1,750	7.1%	3,454	12.3%
Incineration with EfW	1,446	5.9%	2,479	8.8%
Incineration without EfW	614	2.5%	20	0.1%
RDF manufacture	147	0.6%	67	0.2%
Other	0	0.0%	75	0.3%
Total	24,588		28,150	

EfW -Energy from waste

RDF -Refused derived fuel

Source: *Municipal waste management statistics 2000/01, DEFRA*

The Government's obligation under the Landfill Directive has resulted in the setting of statutory targets for local authorities to increase recycling. Statutory targets have been set for individual local authorities, which vary according to the current level of recycling for each authority. Those who currently achieve greater recycling have been set higher targets. Targets are based on the recycling rates calculated from returns to the 1998/99 Municipal Waste Survey.⁷

The Government's commitment to meet these targets was set out in a recent PQ:

Waste Incineration

Mr. Baron: To ask the Secretary of State for Environment, Food and Rural Affairs what plans she has to reduce the proportion of waste disposed of by incineration over the next five years.

Mr. Meacher [*holding answer 19 July 2001*]: Our priority is to meet the requirement of the landfill directive to divert biodegradable municipal waste away from landfill by maximising recycling and composting and minimising the need for incineration and landfill. In order to achieve this the Government have set tough statutory targets under best value for local authorities to double the amount of household waste recycled by 2003-04 and treble it by 2005-06, and will set further targets for later years.⁸

Waste reduction and increased recycling will reduce the proportion of MSW going to landfill. However, because there will be an increased amount of MSW being produced

⁷ The Incineration Directive specifies that all new incinerators should include plans to recover energy either as heat or electricity, as far as practicable

⁸ HC Deb 23 October 2001 c163W

overall, estimated at 3% a year in the next few years at least, and there is a requirement to divert waste from landfill, alternative routes of disposal need to be found. Incineration with energy recovery has proved to be one of the favoured options in the move away from landfill. However it is also proving to be one of the most controversial.

c. Municipal Waste Incinerators currently operational

The Environment Agency estimates the total of incinerators in England and Wales to be around seven thousand:

- 11 burn municipal waste
- some 60 burn wastes including chemicals, clinical waste and sewage sludge
- over 10 are cement kilns or power stations co-incinerating waste
- over 3,000 burn wood
- about 1,700 burn waste oil
- some 3,000 are small farm incinerators.⁹

Below is a list of all the MSW incinerators currently operational in England and Wales, together with their incineration capacity.

Name	Location	Capacity (thousand tonnes a year)
Nottingham	Nottingham	150
Edmonton	London Borough of Enfield	600
SELCHP	London Borough of Lewisham	420
Cleveland	Stockton on Tees	245
Bolton	Bolton	130
Coventry	Coventry	220
Dudley	Dudley	90
Stoke on Trent	Stoke on Trent	200
Tyseley	Birmingham	350
Wolverhampton	Wolverhampton	105
Sheffield	Sheffield	135
Total		2,645
Average		240 ¹⁰

In addition there are two small refused-derived fuel (RDF) incinerators in operation, one on the Isle of Wight and one at Pebsham.¹¹ There are two MSW incinerators in Scotland,

⁹ Environment Agency, *Environmental facts and figures: waste incineration*. 24 April 2002
<http://www.environment-agency.gov.uk/>

¹⁰ Energy From Waste Association Website, April 2001

¹¹ Refuse-derived fuel is bulk waste from which recyclable or non-combustible materials have been removed, the remainder is then processed into a uniform fuel. RSF has a higher calorific value than MSW but is costly to produce.

one in Dundee and one in Lerwick, with 200 and 26 thousand tonnes per year capacity respectively.¹²

Large plants are regulated by the Environment Agency and details are available on the Environment Agency's public register. Smaller non-hazardous incineration plants are regulated by local authorities and detailed information is held separately by each local authority on a public register.

d. Waste Management in Other European Countries

It is difficult to compare data on waste management across European countries. There is a great deal of variation on how data are collected and comparisons are difficult as Member States use different waste classifications. In addition, there is no obligation to produce any data. The EU is currently in the process of producing regulations on waste management statistics to establish a harmonised system that will allow comparisons to be made across the EU.¹³

The European Commission does publish an annual report on waste generated in Europe. The 2000 edition states the following on the issue of waste treatment and disposal:

The best accepted method to achieve management of waste is waste prevention followed by - and in the following hierarchical order - treatment methods such as recycling, composting or incineration (preferably combined with energy recovery), and landfill. Despite the recommendations mentioned, municipal waste treatment in most countries continues to be dominated by landfill, which is in many cases the cheapest option. Nevertheless, incineration is a method which is increasingly used.¹⁴

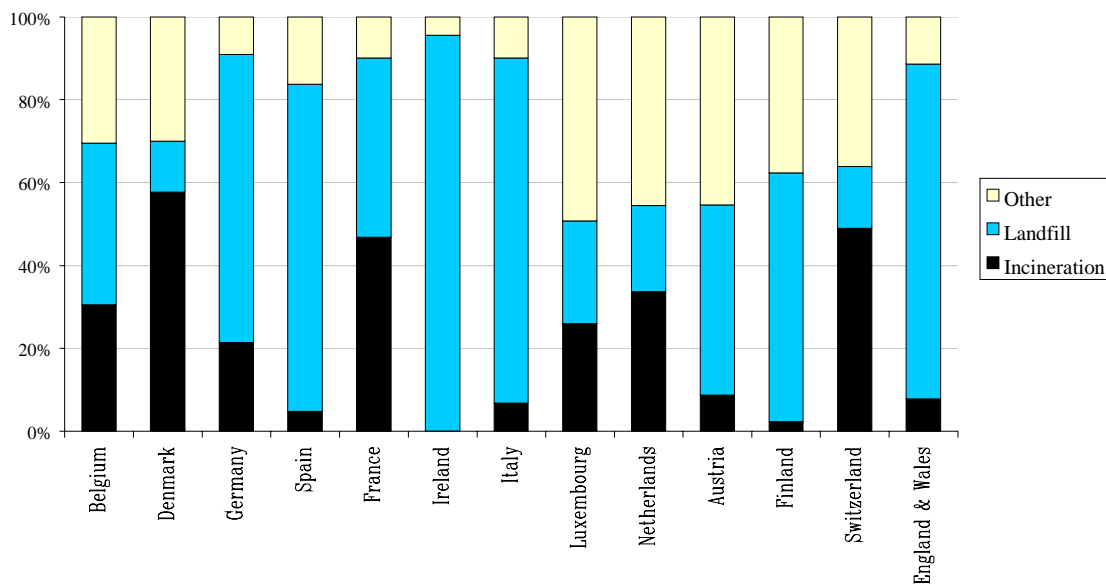
The main findings were that Denmark, Switzerland and the region of Brussels incinerate significant quantities of municipal waste (40-60%) and that incineration plants with energy recovery are gradually increasing in Western Europe. Chart 1 shows the pattern in a number of European countries. The difficulty in collecting national data is reflected in how out of date some of the available information is.

¹² Energy From Waste Association Website, April 2001

¹³ EU Document 501PC0137, Amended proposal for a Regulation of the European Parliament and of the Council on waste statistics (presented by the Commission pursuant to Article 250 (2) of the EC-Treaty) http://europa.eu.int/eur-lex/en/com/dat/2001/en_501PC0137.htm

¹⁴ *Waste Generated in Europe 1985-1997*, Eurostat, 2000

Chart 1
Treatment and disposal of municipal waste, by method in western Europe

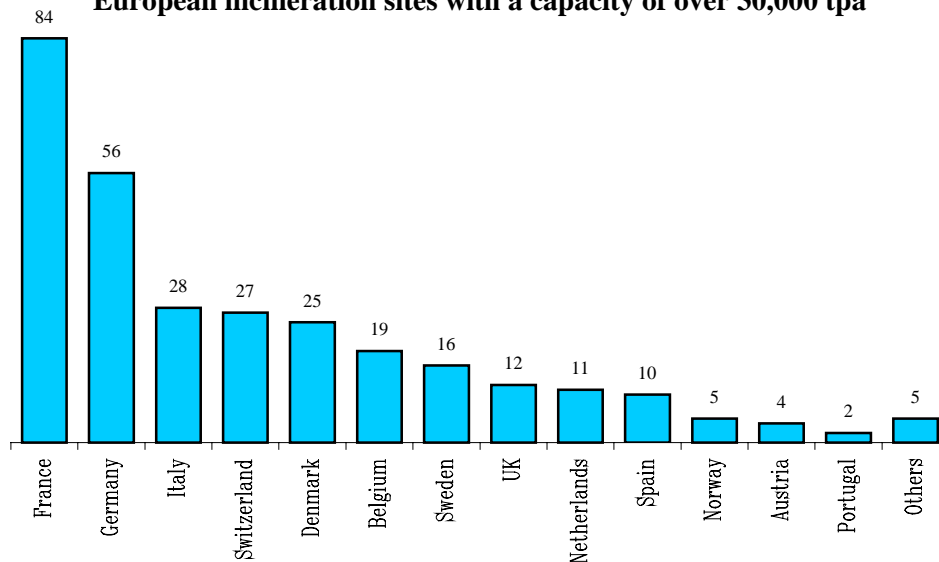


Note: 1996 data except Germany (1993), Finland and Switzerland (1994) France and Ireland (1995) and England & Wales (1999/00)
 Source: Waste Generated in Europe 1985-1997, Eurostat (2000)

Countries that dispose of a significant proportion of their waste by recycling also tend to have higher incineration rates. This is probably a combination of two factors: the reduced availability of suitable landfill sites and the implementation of the waste hierarchy which defines reduction, reuse and recycling of waste as the preferred option and landfill as the least desirable form of waste disposal. Incineration with energy recovery is seen as preferable to landfill within this framework.

Chart 2 shows data from ASSURE, the Association for the Sustainable Use and Recovery of Resources in Europe. These show that the UK currently has 12 incinerators representing 4% of the total number of large incinerator sites in Western Europe.

Chart 2
European incineration sites with a capacity of over 30,000 tpa



Source: 4th Biennial Survey, Juniper

In Europe generally, as in the UK, new emission controls in the 1990s resulted in the closure of many incinerators. UK numbers decreased from 32 in 1992 to 12 in 2001. In Europe as a whole numbers decreased from 415 in 1993 to 255 in 1997, and had increased to 304 by 2000. At the same time the average size of incinerators has increased, from around 125,000 tonnes per annum (tpa) in the 1980's to around 230, 000 tpa in 2000.¹⁵

II Incineration Process

Incineration of municipal solid waste with energy recovery is a process that involves several stages.

a. Waste delivery, bunker and feeding system

The fuel properties of MSW will depend on several factors, including the composition and moisture content. Wetter waste with a higher organic content requires greater energy input to reach the correct combustion temperatures. Waste with a high metal content will also be less combustible. Pre-sorting and mixing of waste to increase its homogeneity and to remove any recyclable portion can influence combustability.

b. Furnace

The most common form of incineration of MSW is mass burn. This involves a series of furnaces into which the waste is fed and where temperatures are in the region of 850°C to 1200°C, the optimum temperature being 1100°C. The waste remains in the furnace for 45 to 70 minutes to ensure complete combustion. There may be auxiliary burners as part of the furnace to ensure that temperatures are maintained. The solid fraction of the combusted waste, the bottom ash, is removed via conveyor belt and collected for disposal or further use.

c. Heat and Energy Recovery

The temperature of gases leaving the furnace is in the range of 800-1100°C. Gas temperatures must be no higher than 250-300°C to ensure pollution removing measures are carried out efficiently, therefore gases have to be cooled. This is done by using them to heat water which can then be used within the incinerator, or externally in community heating systems. The resulting steam can also be used to drive turbines and generate electricity. Most modern incinerators include some form of energy recovery or combined heat and power (CHP) in their design.

¹⁵ ASSURE, *Incineration in Europe*, October 2000.
<http://www.assurre.org/currentissues/incinerationprofile.ppt>

In 2000, MSW incineration generated around 1,400 gigawatt hours (GWh) of electricity. This was 0.4% of all UK electricity production and compares to 946 GWh from wind power, 5,108 GWh from hydroelectricity and 2,188 GWh from landfill gas. When energy used to generate heat is included MSW incineration provided 0.2% of total UK energy supply.¹⁶

d. Pollution Control

Cooled gases and the airborne fraction of the ash (fly ash) are passed through several filters and precipitators designed to remove a large proportion of particulate and gaseous pollutants, before being released into the atmosphere.

III Emissions from Incineration

Emissions from incinerators have been increasingly restricted over the last 30 years as a result of growing concerns about environmental and health impacts. Legislation, control measures and the concerns regarding emissions are discussed within this section.

a. Changing Technology and Emission Controls

The permitted levels of emissions from incinerators have been greatly reduced over the last 30 years. The *Clean Air Act 1968* first gave powers to ministers to set limits of emissions of particulates, until then the general advice was to design plants for a maximum emission into air of 460 milligrams of particulates per cubic metre (mg/m^3). Any other pollutants were dealt with by dispersion through the height of chimney-stacks rather than removal.¹⁷ By 1983, the powers contained in the *Clean Air Act* had not been implemented and there was still no legislation relating to the release of particulates. However best practice involved the installation of precipitators to ensure that particulate emissions did not exceed $200\text{mg}/\text{m}^3$.¹⁸ Following two EU Directives in 1989 on preventing pollution from new and existing MSW incineration plants, the *Environmental Protection Act 1990* (EPA 1990) gave ministers the powers to set emission levels, for any substances, for both old and new incinerators. These were set as follows:

¹⁶ DTI, *Digest of UK energy statistics*, 2001

¹⁷ The Institute of Fuel, *The Incineration of municipal and industrial waste*, 16 November 1969

¹⁸ Holmes, J.R., *Practical Waste Management*, 1983, John Wiley & Sons

Table 3

Emission limits set by the *Environmental Protection Act 1990*

New plant from 1 April 1991, existing plant from 1 December 1996

Total Particulate Matter	30 mg/m ³
Volatile Organic Compounds	20 mg/m ³
Sulphur Dioxide	300 mg/m ³
Oxides of Nitrogen	350 mg/m ³
Hydrogen Chloride	30 mg/m ³
Hydrogen Fluoride	2 mg/m ³
Dioxins	1 ng/m ³
Arsenic, Chromium, Copper, Lead	
Manganese, Nickel and Tin (total)	1 mg/m ³
Cadmium	0.1 mg/m ³
Mercury	0.1 mg/m ³
Minimum temperature	850°C
Oxygen	>6% O ₂

ng/m³: billionth of a gramme per cubic meter

Source: HMSO, *Waste and Recycling, Municipal Waste Incineration, EPA Act 1990 Process Guidance Note IPR 5/3, 1992*

Retrospective installation costs of measures to comply with the EPA 1990 were in the region of £10-15million for many incinerators. As a result the type of pollution reduction measures that are now usually included are: filters and other devices to remove particulates, acid gas scrubbers to remove acid gases such as hydrogen chloride and sulphur dioxide. Nitrous oxides are controlled by the combustion process and by reduction or denitrification. Organic compounds, dioxins and mercury are removed using activated carbon.

The effect of the new regulations was summarised in the Waste Strategy 2000:

The environmental performance of waste incinerators has improved immensely since the early 1990s. In 1992 there were 32 municipal waste-only incinerators. Following the agreement in 1989 of tight controls on incinerator emissions in Europe, and the imposition of UK-wide dioxin controls, most municipal waste incinerators in England and Wales were closed. A few facilities were upgraded to meet these tough standards, and new incinerators built to comply with the standards have come on-line over the past 2-3 years. The proposed Waste Incineration Directive includes even tighter controls on emission limits, as well as measures to ensure safe and efficient operation of incinerators.¹⁹

¹⁹ DETR, *Waste Strategy 2000 England and Wales Part 1, p80, May 2000.*
<http://www.environment.detr.gov.uk/wastestrategy/index.htm>

b. Impacts of Stricter Controls

The National Air Emissions Inventory shows how the impacts of stricter controls have resulted in a decrease in the majority of emissions from all sources of air pollution.²⁰ Table 4 shows how the level of pollutants from MSW incinerators has changed since 1992 and what contribution they make to overall emissions to air in the UK. It can be seen that the proportion of pollutants emitted by incinerators as compared to other sources has decreased for everything, except nitrogen oxides. This has resulted from a combination of stricter controls and the closure of incinerators that were not able to meet these targets. However, it is possible that the proportion of pollutants produced by incinerators may begin to rise again as more are built in the next few years, though this would also depend on changes in contributions from other sources and the impacts of new legislation.

Table 4

Emissions from MSW Incinerators

	1992		1999	
	tonnes	Percentage of total	tonnes	Percentage of total
Cadmium	7.9	35.9%	0.05	0.8%
Mercury	5.1	17.5%	0.11	1.3%
Arsenic	1.1	1.2%	0.48	1.0%
Chromium	13.0	9.3%	0.14	0.2%
Nickel	7.8	1.8%	0.47	0.3%
Lead	130.5	5.5%	0.46	0.1%
Particulates	860.0	0.3%	50	<0.1%
Nitrogen Oxides	5,210.0	0.2%	3310	0.2%
Sulphur Dioxide	3,940.0	0.1%	180	<0.1%
Dioxins and Furans ^(a)	602 g I-TEQ	57.3%	14 g I-TEQ ^(b)	4%

(a) I-TEG : International Toxic Equivalent. This is derived as the sum of the Toxic Equivalent Factor (TEF) of all the dioxins and furans present in a mixture. The TEF for each compound is its relative toxicity in relation to the most toxic dioxin 2,3,7,8 - tetrachlorodibenzo-p-dioxin (TCDD)

(b) 1998 data

Source: UK emissions in detail 1999, National Atmospheric Emissions Inventory

²⁰ National Air Emissions Inventory, *UK Emissions of Air Pollutants 1970 to 1999, 1999*
<http://www.aeat.co.uk/netcen/airqual/naei/annreport/annrep99/index.htm>

c. *Incineration Directive*

A new EU Directive on Incineration of Waste came into force on 28 December 2000.²¹ This sets EU wide permitted emission levels for incinerators, and covers all incineration and co-incineration plants, except those burning the following materials:

- (i) vegetable waste from agriculture and forestry,
- (ii) vegetable waste from the food processing industry, if the heat generated is recovered,
- (iii) fibrous vegetable waste from virgin pulp production and from production of paper from pulp, if it is co-incinerated at the place of production and the heat generated is recovered,
- (iv) wood waste with the exception of wood waste which may contain halogenated organic compounds or heavy metals as a result of treatment with wood-preservatives or coating, and which includes in particular such wood waste originating from construction and demolition waste,
- (v) cork waste,
- (vi) radioactive waste,
- (vii) animal carcasses as regulated by Directive 90/667/EEC without prejudice to its future amendments,
- (viii) waste resulting from the exploration for, and the exploitation of, oil and gas resources from off-shore installations and incinerated on board the installation;

Co-incineration is defined as any stationary or mobile plant whose main purpose is the generation of energy or production of material products which uses wastes as a regular or additional fuel, or in which waste is thermally treated for the purpose of disposal.

The Directive also excludes experimental plants used for research, development and testing to improve the incineration process and which treat less than 50 tonnes of waste per year.

New incineration plants must comply with the Directive by 28 December 2002 and existing plants by 28 December 2005. The new emission limits set out in the Directive are detailed in Table 5 below.

²¹ Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste, Official Journal L 332 , 28 December 2000 p91 -111

Table 5

Emissions Limits set by Directive on Incineration of Waste

Daily Average Values		
Total dust		10 mg/m ³
Total Organic Carbon		10 mg/m ³
Hydrogen Chloride		10 mg/m ³
Hydrogen Fluoride		10 mg/m ³
Sulphur Dioxide		50 mg/m ³
NO ₂ (New or Large incinerators)		200 mg/m ³
NO ₂ (Existing smaller incinerators)		400 mg/m ³
Average Values over sample period:	30 minutes	8 minutes
Cadmium and Thallium Compounds (total)	0.05 mg/m ³	0.1 mg/m ³
Mercury Compounds	0.05 mg/m ³	0.1 mg/m ³
Other Metalloid Compounds (total)	0.5 mg/m ³	1 mg/m ³
Average Values measured over 6-8 hours		
Dioxins and Furans (in toxic equivalents)		0.1 ng/m ³

Some exemptions for nitrous oxides and dust may be authorised for existing incineration plants until 2008. The Directive sets minimum temperatures of 850°C, and includes provisions for auxiliary burners to ensure temperatures are maintained. It also sets out control and monitoring requirements, though according to the Environment Agency these will not significantly impact the current regime in England and Wales.²²

These provisions are expected to further reduce the level of emissions from existing incinerators. However, this may be counterbalanced by the number of planned new incinerators that may be required to deal with waste being diverted from landfill to comply with the Landfill Directive. Estimates on the number that will be needed vary and will depend on their size and the ability to divert waste by reduction, re-use and recycling over the next few years.²³ This is further discussed in section IX.

d. Emissions Monitoring

It is the responsibility of the operators to carry out monitoring of emissions from waste incinerators. These are monitored either continuously or through regular checks. Particulates, total organic carbon, carbon monoxide, sulphur dioxide, nitrous oxides and ammonia are continuously monitored. Spot checks are carried out twice a year for hydrogen fluoride and metals, dioxins and furans. Continuous monitoring is not carried out for these as the Environment Agency does not consider that viable systems currently

²² Pers. Com, Environment Agency, 6 November 2001

²³ 'Waste planning comes of age: the regional picture on rubbish', *Ends Report* 331. December 2000

exist for this.²⁴ In addition, a yearly spot check is commissioned by the Agency and carried out by independent consultants, for which the Agency then charges the operator. Operators have to publish the results from their monitoring on a yearly basis. Though monitoring of dioxins and heavy metals is not continuous, they are correlated to the level of particulates being emitted and breaches in permit levels can be monitored in this way. New incinerators are checked every three months for the first twelve months of operation. Operators are given advance warning of inspections to ensure that incinerators are operational at the time of sampling.

A Greenpeace report published in May 2001 found that according to Environment Agency figures there were 546 self-reported breaches of emissions by incinerator operators in 1999 and 2000. Figures were for all incinerators in England, excluding Bolton.²⁵ The Greenpeace report also states there was only one prosecution as a result of breaches. Prosecution of cases will depend on the severity of the breach. Many, although notifiable, may not be considered serious enough to warrant prosecution:

The Environment Agency initially categorises incidents in accordance with environmental impact on four levels:- major, significant, minor or none. The enforcement response is driven in general by this judgement of severity. The range of possible actions includes issuing a warning letter, a formal warning, serving an Enforcement Notice and serving a Prohibition Notice. Most breaches of authorisation have minor or no impact and in these cases prosecution has only been used as a last resort where other more proportionate methods, for example serving enforcement notices have not proved successful²⁶

A report from the National Clean Air Society, published in March 2001, concluded that though self-monitoring may be compliant with the polluter pays principle, it still generates public mistrust as does the apparent infrequency of sampling. The report concluded that:

The regulators should consider controls (monitoring, inspection, etc) above that which would normally be considered necessary to ensure compliance in order to build public confidence.²⁷

This was also the conclusion of the Select Committee report on delivering sustainable waste management:

²⁴ Environment, Transport and Regional Affairs Committee *Fourth Special Report Delivering Sustainable Waste Management: Government Reply to the Report of Session 2000-01 from the Environment, Transport and Regional Affairs Committee*, HC 659, 5 March 2002

²⁵ Greenpeace, *Criminal Damage: A review of the performance of municipal waste incinerators in the UK*, May 2001, <http://www.greenpeace.org.uk>

²⁶ Environment, Transport and Regional Affairs Committee *Fourth Special Report Delivering Sustainable Waste Management: Government Reply to the Report of Session 2000-01 from the Environment, Transport and Regional Affairs Committee*, HC 659, 5 March 2002

²⁷ NSCA, *Municipal Solid Waste Incineration: health effects, regulation and public communication*, March 2001.

When appearing before us, witnesses from the Agency demonstrated the problem: although they did a perfectly adequate job of explaining how the emissions standards are set for incineration, they failed to explain how the public could be convinced that incineration was safe. This is all the more important because the Agency's credibility as a regulator has been damaged by the case of the Byker incinerator, where potentially hazardous ash from the incinerator is alleged to have "blown all over the surrounding neighbourhood" despite numerous visits from the Agency's inspectors. The Agency does not help itself in dealing with those outside the Agency in the manner in which it handled enquiries by Public Interest Consultants. The Agency adopted a less than open attitude to dealing with the enquiries, answering them in a technically accurate fashion but failing to respond sensibly to the direction of the questioning.

174. Communicating with the public about this issue is, of course, no easy task since it requires an explanation and interpretation of risk, a notoriously difficult concept to treat well in public information terms. Nevertheless, the public's ability to take part in the waste debate rests to some extent upon a better understanding of risk²⁸

In its response to the report the Government acknowledged that in cases where incinerators had a history of non-compliance stricter prosecution guidelines may be necessary:

.... the Environment Agency appreciates that repeated minor breaches can demonstrate a lack of control and is revising its guidance accordingly. Under this guidance prosecutions will normally be pursued for minor incidents where the operator has shown a history of non-compliance sufficient to call into question the effective management of the site /operation or to prevent effective regulation by the Agency.²⁹

IV Emissions and Health Concerns

Is incineration safe? This is one of the questions most frequently asked about this method of waste disposal. It is a difficult question to answer. When looking at risk of any sort it is generally not possible to say that anything is completely safe. Pollutants emitted during the process of incineration can have health implications, depending on the concentrations present, but concentrations have been declining and will decline further as the new Incineration Directive takes effect. Incineration is undoubtedly getting safer, as more stringent emission controls have been put in place, but how safe is difficult to say.

²⁸ Environment, Transport and Regional Affairs Select Committee, Fifth Report: *Delivering Sustainable Waste Management*, 21 March 2001. HC 36-I Session 2000-1.

²⁹ Environment, Transport and Regional Affairs Committee *Fourth Special Report Delivering Sustainable Waste Management: Government Reply to the Report of Session 2000-01 from the Environment, Transport and Regional Affairs Committee*, HC 659, 5 March 2002

This was exemplified by evidence given by the representatives of the Environment Agency to a select committee:

The reason you were not able to answer Mr Benn's question [...] is that incineration is not safe, is it? You cannot give that undertaking. If you were asked, "Is incineration safe?", you cannot say yes.

(*Dr Whitworth*) I cannot give any categoric answer that any waste management option is safe.³⁰

And

But the conclusion one would draw is that understanding of this whole area is frankly at a pretty early stage, on how exactly air pollution affects people's health.

(*Dr Leinster*) The health effects of air pollution, I would agree, are at an early stage.³¹

Concerns exist, particularly in the public eye, with emissions from incinerators as a result of the type of compounds emitted. Many of these have been found to have adverse health effects, though at much higher concentrations than those generally emitted by incinerators. This has raised concerns among the general public regarding possible impacts of lower concentrations, accidental emissions and the impacts of combinations of pollutants on health.³²

A report in January 1998 by the Committee on the Medical Effects of Air Pollutants (COMEAP) summarised the health effects of air pollutants in the UK. The pollutants come from various sources, including transport, industry and incineration:

The evidence for the effect of particles, sulphur dioxide and ozone on deaths brought forward and on respiratory hospital admissions was considered sufficiently robust to be used for quantification. It is important to recognise that the deaths are thought to occur mainly in the elderly with advanced lung or heart disease and to be brought forward by weeks or months but not years, although the loss of life expectancy is not known precisely. Air pollution acts as an aggravating rather than a causal factor and this has implications for judging the importance of its effects.³³

The US National Research Council published a report, *Waste Incineration and Public Health*, in 2000. This concluded that:

Pollutants emitted by incinerators that appear to have the potential to cause the largest health effects are particulate matter, lead, mercury, and dioxins and furans.

³⁰ *ibid*

³¹ *ibid*

³² NSCA, *The Public Acceptability of Incineration*, May 2001

³³ DoH, *Economic Appraisal of the Health Effects of Air Pollution Report*, 1998. <http://www.doh.gov.uk/hef/airpol/eareport.htm#effects>

However, there is a wide variation in the contribution that incinerators can make to environmental concentrations of these contaminants. Although emissions from newer, well-run facilities are expected to contribute little to environmental health concentrations and the health risk, the same might not be true for some older or poorly run facilities.³⁴

Two recent studies have found potential health effects associated with incinerators and other industries. A study carried out for the Small Area Health Statistics Unit for the Department of Health found a very small increase in the levels of liver cancer amongst people living close to incinerators in the 1970's, when emissions from incinerators were much higher.³⁵ A second study carried out in Holland found that urban pollution sources have a measurable impact on the health of young people. Analysis of blood samples showed the presence of a wide range of pollutants and their metabolites, associated with living in a city and close to several industrial processes, including an incinerator.³⁶ Again it has to be remembered that emissions from incinerators have fallen dramatically over recent years and these results may no longer apply in the case of incineration.

a. Particulates

Particulate matter consists of a combination of non-combustible fractions of waste combined with the solid products of incomplete combustion, often carbon. In addition, high molecular weight compounds, like dioxins, are usually present as they condense on the surface of particles, mainly the carbon.

Particulates are measured as PM_{2.5} and PM₁₀ (the figures refer to their diameter in microns or millionths of a metre). Smaller particulates are produced during combustion but are very difficult to measure, though according to a recent study by Greenpeace these form the majority of particulates emitted during incineration.³⁷ Exposure to high levels of particulates has been linked to ill health and death. A recent study in the US found that a 10mg/m³ increase in PM₁₀ caused a 1.2-2.3% increase in hospital admissions for pulmonary disease, heart disease and pneumonia.³⁸

³⁴ US National Research Council, *Waste Incineration and Public Health*, 2000.

³⁵ Elliot, P. *et al*, 2000, 'Cancer Incidence near municipal solid waste incinerators in Great Britain. Part 2: histopathological and case-note review of primary cancer cases', *British Journal of Cancer*, v82 p1103

³⁶ Staessen, J. A. *et al*, 2001, 'Renal Function, cytogenic measurements, and sexual development in adolescents in relation to environmental pollutants: a feasibility study of biomarkers', *The Lancet*, 357 p1660

³⁷ Allsopp, M. *et al*, 2(Greenpeace Research Laboratories), 2001, 'Incineration and Human Health, State of Knowledge of the Impacts of Waste Incinerators on Human Health.', *Environmental Science and Pollution Research International*, 8(2) p141-5.

³⁸ Zanobetti *et al*. 2000, 'Airborne particles are a risk factor for hospital admissions for heart and lung disease', *Environmental Health Perspectives*, 108 (11) 1071-77.

b. *Organic Carbon Compounds*

The main compounds of concern, other than dioxins and furans for which separate limits exist, are Polycyclic Aromatic Hydrocarbons (PAHs). These are products of incomplete combustion of organic compounds. They are non biodegradable, accumulate in fatty tissues and several of them have been linked to increased risk of cancer.³⁹

c. *Acid Gases*

Municipal waste contains a range of compounds that, when combusted, can result in the generation of corrosive and toxic gases. Hydrogen chloride, hydrogen fluoride, sulphur dioxide and nitrogen oxides are all products of incineration. These all produce acids in the atmosphere, which contribute to acid rain and can contribute to respiratory problems.⁴⁰

d. *Heavy Metal Compounds*

Heavy metals exert a range of chronic and acute toxic health effects including carcinogenic, neurological, hepatic and renal. Cadmium, lead and mercury are of most serious concern from this point of view and have individual emissions limits set for incinerators. Toxic effects associated with these metals generally occur at higher concentrations than those emitted by incinerators, but concentrations present in fly ash can be high, which make correct disposal very important. This is particularly so as the metals are often present in water-soluble forms which can leach into surrounding areas.⁴¹

e. *Dioxins*

The term 'dioxins' is commonly used for a family of 210 closely-related chlorinated chemical compounds. One of the most toxic is 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) and the toxicity of other dioxins and furans are measured against this. They can be formed as by-products in some chemical processes and in various combustion processes such as waste incineration, metal production, the power supply industry, fires and internal combustion engines. Dioxins are generally considered to be toxic and 2,3,7,8-TCDD has been classed as a known carcinogen by the World Health Organisation's International Agency for Research on Cancer.⁴²

The range of potential health effects of dioxins has been extensively reviewed for the Government on three occasions by the Department of Health's Advisory Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT). Until recently the WHO and COT recommended a Tolerable Daily Intake or TDI of 10

³⁹ Williams, P.T, *Waste Treatment and Disposal*, 1998, John Wiley & Sons

⁴⁰ Williams, P.T, *Waste Treatment and Disposal*, 1998, John Wiley & Sons

⁴¹ *ibid*

⁴² 'WHO scientists class dioxin as a human carcinogen', *ENDS Report* 265, February 1997.

picogrammes⁴³ Toxic Equivalents (TEQ) per kilogram of body weight (kg.b.w.).⁴⁴ The WHO guidelines were reviewed in 1998 and reduced to 1 to 4 picogrammes TEQ/kg.b.w.

The main source of dioxins for humans is diet. According to a recent report by the European Commission food consumption contributes 90% of total human exposure, of which fish and animal products account for 80%.⁴⁵ The Food Standards Agency summarised exposure in the UK as follows in a recent statement:

PCBs and dioxins can be detected in all foods and food contributes 95% of all human exposure to these chemicals. The highest concentrations are in fatty foods such as liver and oily fish. The main sources of dioxins in the diet are from meat, meat products and milk and dairy products.

In the UK exposure to dioxins and PCBs in the diet has fallen by 75% over the past 20 years. This has reduced any associated health risks.⁴⁶

COT carried out a review of dietary intake of dioxin and dioxin like compounds in August 2000. This concluded that:

Abatement measures have been taken to control the emission of dioxins to the environment and hence foods. In particular the imposition of strict emission limits on municipal waste incinerators have reduced emissions from this sector by an estimated 90%.⁴⁷

It also recently completed a review of guidelines for the daily intake of dioxins following the changes in the WHO guidelines. This recommended that the tolerable intake be cut from 10 to 2 picogrammes TEQ/kg/day. According to the Food Standards Agency:

In common with USA and the EU, about one-third of the UK population may exceed the TDI in their daily diet. However, of those that exceed, FSA data shows that of almost all will be below 3.5 pg/kg. This represents a very small erosion of the safety margin.⁴⁸

⁴³ A trillionth of a gramme (10^{-12} grammes)

⁴⁴ HC Deb 1 June 1998 c9-10W

⁴⁵ European Commission, EU Strategy on Dioxins, Furans and Polychlorobiphenyls' *Europe Environment* 601, 4 December 2001.

⁴⁶ FSA, *PCBs and dioxins – Food Standards Agency statement*, 16 November 2001
<http://www.food.gov.uk/news/pressreleases/pcbsanddioxins>

⁴⁷ Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment, *Statement on dietary exposure to dioxins and dioxin-like PCBs*, April 2000.
http://www.foodstandards.gov.uk/committees/cot/cot_st3.pdf

⁴⁸ FSA, *PCBs and dioxins – Food Standards Agency statement*, 16 November 2001
<http://www.food.gov.uk/news/pressreleases/pcbsanddioxins>

The US Environmental Protection Agency (EPA) published a draft of its comprehensive reassessment of dioxin exposure and human health effects in 2000. The reassessment found that there is:

Adequate evidence based on all available information, including studies in human populations as well as in laboratory animals and from ancillary experimental data, to suspect that humans may respond with a broad spectrum of effects from exposure to dioxin and related compounds.⁴⁹

The non-technical summary went on to state the following:

The reassessment finds that, based on all available information, dioxins are potent animal toxicants with potential to produce a broad spectrum of adverse effects in humans. Dioxins can alter the fundamental growth and development of cells in ways that have the potential to lead to many kinds of impacts. These include, for example, adverse effects upon reproduction and development; suppression of the immune system; chloracne (a severe acne-like condition that sometimes persists for many years); and cancer. EPA characterizes the complex mixtures of dioxin to which people are exposed as a “likely human carcinogen.” This is based on the fact that individual components of this mixture could be characterized as “human carcinogens” or “likely human carcinogens” under EPA’s draft cancer risk assessment guidelines (1996, 1999). In particular, TCDD, the most toxic of the dioxins, can be identified as a “human carcinogen” under the Agency’s draft guidelines, based on the weight of the animal and human evidence, and the other dioxins as “likely human carcinogens.”⁵⁰

There has been extensive work that shows dioxins to have adverse effects, particularly in animals. There are those, however, who feel that the concerns about dioxins are not fully justified:

Dioxins provide a classic example of the sensationalism that often pervades the waste management field. In reality, our understanding of dioxins and furans and their impact is very incomplete owing to the large number of similar compounds, the complex systems within which they exist (biosphere, waste management facilities), and their low concentrations, as well as because analytical techniques for their detection became available only recently. However, this has not prevented both sides from making unsubstantiated and often outrageous claims.⁵¹

When considering dioxins it has to be remembered that exposure comes from a variety of sources, including waste incineration, crematoria, industrial processes, domestic and industrial combustion of coal and wood. Department of the Environment figures for

⁴⁹ US Environmental Protection Agency, *Dioxin: Scientific Highlights from Draft Reassessment* (2000). <http://cfpub1.epa.gov/ncea/cfm/dioxreass.cfm?ActType=default>

⁵⁰ US Environmental Protection Agency, *Dioxin: Summary of the Dioxin Reassessment Science* (Draft), 2000.

⁵¹ From H Tammemagi, *The Waste Crisis*, 1999, p 156

1994, before new emission limits of $1\text{ng}/\text{m}^3$ (a billionth of a gramme per cubic metre) came into force in 1996, showed that municipal waste incinerators were by far the highest emitters of dioxins in the UK. This was predicted to fall by a factor of 30-40 once the emission limits came into force.

This has been shown to be the case. According to the National Atmospheric Air Emissions Inventory, emissions of dioxins from MSW incinerators were the largest source and contributed 55% of the total emissions in the UK in 1990, whereas in 1997 they contributed 3%, with the greatest source being fires, sinter plant⁵² and other (unspecified) sources, which contributed 51%. Total UK dioxin emissions have decreased from 1,092 to 325 grammes of International Toxic Equivalents per year in the same period.⁵³ However figures for 1998 show the contribution of MSW incineration increasing to 4%. A further reduction in emission can be expected once the new Incineration Directive comes into force, as limits on dioxin emissions will be $0.1\text{ng}/\text{m}^3$ of air.

As pointed out, other sources of dioxins, for example domestic and forest fires, have not changed significantly and now contribute a larger proportion of dioxin emissions to the atmosphere. This issue was raised in Parliament as a result of carcasses being disposed of by burning during the recent foot and mouth epidemic:

Dioxin Emissions

Mr. Grieve: To ask the Secretary of State for the Environment, Transport and the Regions what assessment has been made of the quantity and effect of emissions into the air of dioxins resulting from the burning of coal slag, railway sleepers and the other materials being used for the incineration of animals culled for the purpose of eradicating foot and mouth disease; and if he will make a statement.

Mr. Meacher: My Department has asked the National Environmental Technology Centre of AEA Technology to calculate amounts of air pollutants, including dioxins, particles (as PM_{10}) and nitrogen oxides, released from the burning of carcasses and fuels on the pyres. At present, it is estimated that the amount of dioxins released from the burning on pyres to date is about 10-20g. This is equivalent to about 3-6 per cent. of the total annual emissions of dioxins in the UK. This is roughly equivalent to the amount released annually from domestic burning of coal and wood and is less than one third the amount released annually from accidental fires and other open burning sources.⁵⁴

⁵² Sintering: An industrial process which involves thermal treatment of a powder or compact at a temperature between 60 and 90% of the melting-point of the particular metal or alloys

⁵³ National Atmospheric Emissions Inventory 1998, The UK National Air Quality Information Archive, <http://ariadne.aeat.co.uk/netcen/airqual/naei/annreport/annrep98/naei98.html>

⁵⁴ HC Deb 364 c429W 26 Mar 2001

In addition, the five top producers of dioxin emissions in the UK for 1998, none of which were municipal waste incinerators, were identified by Mr Meacher.⁵⁵

Company	Dioxins emission to air Grams of toxic equivalents (1-TEQ) (per year)
Corus (formerly British Steel), Llanwern Works	13
Corus (formerly British Steel), Port Talbot Works	10
Corus (formerly British Steel), Brigg Road	9
Calder Industrial Materials Ltd.	8
Allied Steel and Wire Ltd., Tremorfa Works	7

The recent European Commission strategy on dioxins identifies the main sources of emissions into the atmosphere that are of concern as industrial processes, particularly electric arc furnaces and the iron and steel industry, and domestic burning of coal, treated wood and other waste.⁵⁶

V Environmental Impacts

Incinerators have various environmental impacts. The emissions released into the atmosphere from the incineration, though in the case of most pollutants greatly reduced, can have implications for atmospheric pollution. The impact of transporting waste to and from incinerators also has environmental implications. In addition the siting of incinerators can have implications for the amenity of a local area.

The NSCA report on incineration lists the following possible negative environmental impacts:

- Emissions of toxic substances to air
- Emissions from transport
- Production of hazardous waste (fly ash)
- Contaminated waste water
- Combustion produces carbon dioxide, a green house gas.
- Odours and possible vermin at waste storage prior to incineration⁵⁷

Emissions from transport of waste, together with odours and other associated problems, are issues that affect all waste management facilities to a lesser or greater degree.

⁵⁵ HC Deb 351 c242W 7 Jun 2000

⁵⁶ European Commission: EU Strategy on Dioxins, Furans and Polychlorobiphenyls' *Europe Environment*, 601, 4 December 2001

⁵⁷ NSCA, *The Public Acceptability of Incineration*, May 2001

a. Emissions

Emissions from incinerators have implications not only from a health point of view, but also from an environmental one. Emissions of acid gases from industrial processes, incineration and transport result in acid rain and the environmental impacts associated with this. Increased acidification of the atmosphere over the past century resulted in acid damage to buildings, the water environment and forests. As can be seen in Table 4 (page 16) the main source of these emissions are not incinerators, which currently contribute less than 1% of nitrous oxides and sulphur dioxides produced in the UK. Carbon dioxide emissions as a result of combustion of waste also have implications in relation to climate change.

b. Transport

One of the frequently stated objections to the siting of large incinerators is the increased heavy traffic that will result as waste is imported from surrounding areas. Transport of waste over large distances not only has implications for air quality, but also for climate change through increased energy use and subsequent carbon dioxide emissions.

Planning guidance for waste management includes the following considerations on the type of transport and the access to waste sites:

Transport by road is the commonest, though not necessarily the most desirable, means of carrying wastes to management facilities. Alternatives include using or adapting existing rail facilities, making new connections to the rail network, or developing existing port facilities, marine wharves and river or canalside facilities. Transportation by rail is particularly appropriate for facilities such as large incinerators. Residual bottom ash has a high density compared to raw waste materials, making it suitable for regular bulk rail haulage to final disposal or to secondary uses such as construction fill. Opportunities for using forms of transportation other than road haulage should be considered actively and seriously by planning authorities when preparing waste development plans, and by prospective developers in putting forward proposals.

Where road transport is unavoidable, access to the site is likely to be a relevant consideration. Ideally there should be direct local access to a new plant from roads of an adequate standard within the local road network. Where it is not, planning conditions should ensure that satisfactory access is provided before operations commence⁵⁸

⁵⁸ DTLR, PPG No 10 *Planning and Waste Management*, February 1997
<http://www.planning.dtlr.gov.uk/policy.htm>

c. *Ash*

The operation of an incinerator results in the production of waste ash that requires correct disposal. Wastewatch estimate that:

A modern municipal waste combustion plant with energy recovery, processing 400,000 tonnes per year of municipal solid waste, will reduce a tonne of waste to about 291 kg of bottom ash residues and 45 kg of fly ash. The volume of the original waste is reduced by 90% and the weight by 70%.⁵⁹

Bottom ash is fine material from the bottom of an incinerator and usually contaminated with dioxins and heavy metals but not severely so, and therefore can be recycled in various ways. Fly ash is fine and ultrafine material collected in the stack by various filter systems of an incinerator and is always highly contaminated. Currently fly ash, which is considered hazardous waste, can be co-disposed of to landfill by mixing with non-hazardous waste, often bottom ash. From 2002, under the Landfill Directive, hazardous waste will no longer be co-disposed of,⁶⁰ instead it will have to go to special hazardous landfill sites.

Monitoring of the disposal of incinerator ash has also become an issue in the light of the discovery that fly ash from the Byker incinerator in Newcastle, was mixed with bottom ash and used at allotment sites. According to press reports 2,000 tonnes of this ash, which has been found to contain high levels of dioxins were disposed of in this way. The Environment Agency has brought a prosecution in which the council and the company that ran the plant have admitted 3 charges between them.⁶¹ In addition reports by the press on the use and storage of ash from Edmonton incinerator, which contained high levels of dioxins, have highlighted further problems. Construction blocks manufactured using the ash where found to contain high levels of dioxins.⁶²

VI Government Policy

The Government published *Waste Strategy 2000* in May 2000.⁶³ The strategy sets out how the Government sees the need for changing the way waste is dealt with, what its vision is and how it intends to achieve a change in the way waste is produced and

⁵⁹ Wastewatch, *Energy From Waste*, December 2001

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

⁶⁰ Co-disposal: this involves the mixing of non-hazardous and hazardous waste and its disposal to non-hazardous landfill sites. The hazard is removed by dilution of the pollutants to an acceptable level.

⁶¹ 'New Court move over toxic ash', *The Journal (Newcastle)*, 1 November 2001

⁶² "Parliament misled over recycled dioxins: concerns over poison's spread as environment agency condemned as 'devious' by member of its own board" *The Guardian*, 22 November 2001.

⁶³ DETR, *Waste Strategy 2000*, 25 May 2000.

<http://www.environment.detr.gov.uk/waste/strategy/cm4693/index.htm>

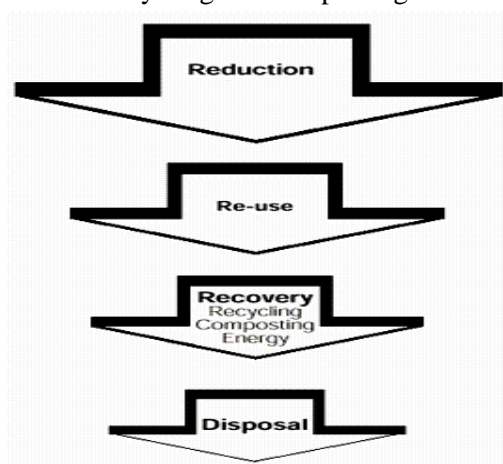
disposed of. The strategy sets local authorities statutory recycling targets and introduces various other measures to encourage waste minimisation and increase recycling.

The strategy is based on the implementation of the Best Practicable Environmental Option (BPEO). This was defined by the Royal Society as the outcome of a systematic and consultative decision making procedure that emphasises the protection and conservation of the environment across land, air and water. The BPEO procedure establishes, for a given set of objectives, the option that provides the most benefits or the least damage to the environment as a whole, at acceptable cost, in the long term as well as in the short term.⁶⁴ How BPEO was to be applied to waste management was outlined in the strategy:

4.4 The right way to treat particular waste streams cannot be determined simply. The objective is to choose the Best Practicable Environmental Option (BPEO) in each case. BPEO varies from product to product, from area to area and from time to time. It requires waste managers to take decisions which minimise damage to the environment as a whole, at acceptable cost, in both the long and short term. A more detailed description of how decision makers can identify the BPEO is at Chapter 3 section starting 3.3 in Part 2 of this strategy.

4.5 In determining BPEO we will expect those making decisions to take account of three key considerations:

- the waste hierarchy. Within the hierarchy, the Government and the National Assembly do not expect incineration with energy recovery to be considered before the opportunities for recycling and composting have been explored



- the proximity principle requires waste to be disposed of as close to the place of production as possible. This avoids passing the environmental costs of waste management to communities which are not responsible for its generation, and reduces the environmental costs of transporting waste

⁶⁴ Royal Commission 12th Report on Environmental Pollution, *Best Practicable Environmental Option*, Cm 310, February 1988

- self-sufficiency. The Government believes that waste should not be exported from the UK for disposal. Waste Planning Authorities and the waste management industry should aim, wherever practicable, for regional self-sufficiency in managing waste⁶⁵

A. The Role of Incineration

In the draft waste strategy *A Way with Waste*, published in July 1999, there was strong support for the use of incineration with energy recovery as a way of disposing of municipal waste:

The Government believes that modern incinerators have an important role to play in a system of integrated sustainable waste management. Incinerators are tightly regulated, and we are confident that these controls protect human health and the environment. Of course, care must be taken to ensure that incineration contracts are sensitively designed, to avoid 'crowding out' of recycling. In all cases, those developing incinerators should consider the potential for incorporating combined heat and power (CHP) facilities, to use the available heat as efficiently as possible.⁶⁶

It also included a calculation of how many incinerators may be needed to meet the forecast increase in waste produced:

The Regulatory Impact Assessment for the Landfill Directive suggested that, assuming recycling at 25%, around 8-33 million tonnes of incineration capacity (this equates to 28-165 new incinerators, assuming an average capacity 200,000 tonnes) might be needed to meet the final target in the Directive (to reduce biodegradable municipal waste to 65% of 1995 arising).⁶⁷

However when the final version of the strategy was published, *Waste Strategy 2000*, there was a reduced emphasis on the commitment to incineration, with specific numbers of incinerators not mentioned in the main report:

The Government and the National Assembly believe that recovery of energy from waste, through using it as a fuel, has an important role to play alongside recycling and composting in a system of sustainable waste management. Energy from waste plant should be appropriately sized and care must be taken to ensure that contracts are sensitively designed to avoid 'crowding out' recycling. They should be developed as part of an integrated system that includes other waste management options. Where appropriate, operators should recover value from

⁶⁵ DETR, *Waste Strategy 2000: Part 1*, 25 May 2000.

<http://www.environment.detr.gov.uk/waste/strategy/cm4693/index.htm>

⁶⁶ DETR, *A Way with Waste A Draft Waste Strategy for England and Wales*, July 1999,

<http://www.defra.gov.uk/environment/waste/strategy/index.htm>

⁶⁷ *ibid*

residues such as bottom ash. This could be by recovering metals, or manufacture into construction materials.⁶⁸

And

If we are to achieve a sustainable waste management system, then incineration with energy recovery will need to play a full and integrated part in local and regional solutions developed over the next few years. Waste to energy incineration must be considered in the context of an integrated approach to waste management which encourages waste reduction, re-use and recycling. Where incineration with energy recovery is the best practicable environmental option, the potential for incorporating combined heat and power should always be considered in order to increase the efficiency of the process. Energy from waste schemes will be given a boost by the exemption of renewable energy and of good quality combined heat and power from the Climate Change levy.⁶⁹

The Environment Agency, which has the role of regulating the treatment, disposal and storage of waste, recently published a position statement on sustainable waste management. They state that they have no objection in principle to incineration provided that:

it does not undermine better waste management options within the waste hierarchy; it represents the Best Practicable Environmental Option (BPEO) for disposal taking into account the waste hierarchy; it forms part of a regional or local strategy developed by local authorities based on the BPEO, taking into account the waste hierarchy and the need to dispose of waste in the nearest appropriate installation; the size, location and type of incinerator is consistent with the regional strategy and with statutory requirements to establish an integrated and adequate network of waste disposal installations; and individual incinerators meet stringent controls so as to minimise pollution of the environment, impact on human health and the effects on the local amenity.

The Government position on incineration, within the framework of the waste strategy, may change as it has recently announced that the strategy is to be reviewed by the Performance and Innovation Unit. The Unit is due to report back in summer 2002. The review was announced following a recent Government summit on Waste. The discussions on incineration that took place at the summit highlight the wide differences of opinion that currently exist:

This was an area where there was little consensus amongst participants. There were those who sought an end to any new incinerator proposals and those who saw a level of incineration as a necessary part of delivering the Waste Strategy and also making a positive contribution to energy recovery. There were concerns

⁶⁸ DETR, *Waste Strategy 2000 England and Wales Part 1*, p19, May 2000.
<http://www.environment.detr.gov.uk/wastestrategy/index.htm>

⁶⁹ *ibid.* Part 2, p78

that incineration might "crowd out" recycling by taking the raw materials, (especially as incineration was a long term investment decision) although countries with high recycling also had higher incineration than the UK. There were concerns expressed about health, although others said that incinerators were both safe and a very minor source of pollutants.⁷⁰

B. Reactions to Government Policy

a. General

Reactions to the publication of Waste Strategy were generally positive. A leader article in *The Independent* stated:

We must put a price on the poisonous legacy we are leaving future generations, and then the market forces can ensure that we use resources more efficiently and less wastefully than we do now.

If Mr Meacher's waste strategy is assessed against the need to move further in this direction, it deserves some praise. Bringing in compulsory legal targets for the proportion by weight of rubbish to be recycled certainly moves beyond the exhort-and -aspire approach of previous governments. Readers with long memories will remember Chris Patten in 1989 setting a non-statutory target for the year 2000 of 25 per cent. The figure now is 9 per cent.⁷¹

Waste Watch, a cross-sectoral organisation promoting waste reduction, welcomed the strategy:

Waste Watch welcomes the publication of Waste Strategy 2000, and is pleased that at last we have a statutory framework for the move towards sustainable waste management. We offer broad support for the aims of the strategy, but with some reservations. It does not fulfil all the desires we may have as an organisation, but is an important and substantial step forward, and should therefore be welcomed. We face enormous hurdles in achieving the desired "step change" in the way we deal with waste, and a diverse and sustained approach is needed, as no one waste treatment option on its own can meet the demands placed upon us from Europe.⁷²

The Institute of Waste Management also welcomed the strategy but:

Feels that questions remain as to whether adequate funding will be made available to achieve the measures outlined in the Strategy.⁷³

⁷⁰ DEFRA, Waste Summit; delivery of Waste Strategy, 7 December 2001, <http://www.defra.gov.uk/environment/waste/review/summary.htm>

⁷¹ "Sometimes it would be better if ministers talked a bit more rubbish", *The Independent*, 26 May 2000

⁷² Waste Watch, *Response to Waste Strategy 2000*, May 2000, <http://www.wastewatch.org.uk/>

⁷³ IWM Press Release, *Adequate funding vital if aims of Government's Waste Strategy to be achieved*, 26 May 2000. <http://www.biffa.co.uk/pdf/aqb.html>

However organisations as diverse as Friends of the Earth and Biffa Waste had been critical of the *draft* strategy in the past. In response to the draft strategy Biffa produced a report *A Question of Balance* which contained several criticisms of the Government approach:

As a company at the heart of the waste debate, we readily accept that landfill's historic role is declining. Unlike other objectors, we also accept that the risks of pollution from large scale incineration plants can be minimised, through efficient temperature control and the use of sophisticated air pollution removal equipment.

Nevertheless, we fear that the sheer scale of the Government's proposed shift to energy from waste plants threatens to tip the scales too far one way. In common with organisations such as Friends of the Earth, we believe mandatory recycling targets for businesses and households would be a more environmentally acceptable option.

Our view is that a proliferation of energy from waste plants, will do nothing to accelerate the true drivers for increasing a product's sustainability throughout its life, namely eco-friendly design by manufacturers, less use of toxic substances and higher rates of material recovery and re-use. It will also do little to enhance pressure on the makers and suppliers of goods to reduce the amount of waste they produce and increase the amount they recycle. Instead, by providing a simplistic, end of pipe solution, we believe a large incinerator building programme would act as a brake on the use of more innovative green technologies.⁷⁴

Friends of the Earth have campaigned in the past against the strategy because of its inclusion of incineration of waste for energy recovery and their response to the final version of the Waste Strategy was critical:

The Government's new waste strategy, published today, has failed to remove the threat of scores of new incinerators being built in communities across the country, Friends of the Earth said today (see likely locations attached). Whilst the strategy sets new recycling targets, it has failed to provide the money for them to be met. Friends of the Earth is calling for the much discredited landfill tax credit scheme to be abolished and the £70 million a year raised to be used to back local authority recycling schemes. Friends of the Earth fears that the waste strategy could leave the UK at the bottom of the league for recycling. In the Netherlands, for example, over 40 per cent of household waste is recycled and the authorities are aiming for 60 per cent by the end of this year.⁷⁵

Friends of the Earth opposes incineration for the 80% of municipal solid waste it claims can be recycled or composted for a variety of reasons:

⁷⁴ Biffa, *A question of balance*, 1999, <http://www.biffa.co.uk/pdf/aqb.html>

⁷⁵ FOE Press Release, *FOE hits out at pro-burning waste strategy*, 25 May 2000

- Incineration destroys valuable resources, which could be reused. It exacerbates climate change because when materials are burned, more fossil fuel energy is used to replace the products through mining, manufacturing, and transportation around the world. Energy from burning waste is not renewable.
- It undermines councils' recycling schemes by demanding long-term waste delivery - Because it takes 15-25 years for a waste management company to make a return on their capital investment, the contract between a council and a waste management company requires the council to provide an agreed amount of waste for at least 25 years.
- It creates very few jobs. The recycling industry however offers enormous potential for substantial job creation.
- It is a much more capital-intensive and costly approach than recycling.
- It creates more noise and traffic. Incinerators can also be regarded as eyesores.⁷⁶

However the Energy from Waste Association (now part of the Environmental Services Association) supports incineration as a necessary part of a waste management strategy:

Without the contribution of a planned and regulated programme of development of new energy from waste plants, working alongside initiatives to massively increase recycling and composting, the UK stands no chance of meeting its obligations under the EU landfill directive.⁷⁷

b. Select Committee Report on Sustainable Waste Management

The Environment, Transport and Regional Affairs Select Committee published a report in March 2001 on *Sustainable Waste Management*. This was very critical of the Strategy generally and of the Government's approach to incineration in particular:

The *Waste Strategy 2000* fails to offer an inspiring vision of sustainable waste management. It sets some useful short and medium term targets, but without the inspiration provided by a longer-term vision of what we are trying to do, it risks succeeding in its own narrow terms whilst failing to provide a foundation for a more sustainable system.⁷⁸

The role of incineration, as outlined in the Strategy, was particularly criticised:

The absence of strategy is best demonstrated by the example of the proper role of incineration. The Strategy does not define what it sees as the appropriate scale or level of incineration and Ministers and officials refused to define this when they

⁷⁶ Friends of The Earth Briefing, *Waste management methods*, April 2001
http://www.foe.co.uk/resource/briefings/waste_manage_methods.pdf

⁷⁷ Letter, "...with two sides to it", *The Guardian*, 21 May 2000.

⁷⁸ Environment, Transport and Regional Affairs Select Committee, Fifth Report: *Delivering Sustainable Waste Management*, 21 March 2001. HC 36-I Session 2000-1

appeared before us. The gap between recycling and recovery targets invites authorities to deduce that they should 'recover' the difference, so that as much as 33% of the waste stream could be incinerated by 2015. So, without such guidance and with the pressure to reduce the amount of waste landfilled combined with only limited support for increasing recycling, incineration takes on a looming presence and could quickly eat into the potential for increased recycling and composting in future years.⁷⁹

The committee came to the conclusion that contradictory signals from the Government regarding incineration were a result of disagreements between departments:

By piecing together the statements from several witnesses, it seems clear that the DETR are generally opposed to a big role for incineration, the DTI are very keen, and the Treasury are cooler but still in favour.⁸⁰

The Select Committee Report was debated in the House on 11 December 2001. During this the Chairman of the committee, Andrew Bennett, expressed concern about building large incinerators with long term requirements for waste as fuel and the danger that new incinerators be built where there is least local resistance:

Whatever one says about emissions, my impression is that no one wants an incinerator or a combined heat and power plant near their home. If the Government intend to encourage them, we need a demonstration combined heat and power plant located somewhere central--perhaps within half a mile of the Palace of Westminster. Such plants should be in town centres, where the hot water generated can be used. It is wrong to think that a CHP plant can be sited at the back of some depressed housing area where no one will make a fuss.

If we adopt a policy of building CHP plants, we should look for town centre locations and demonstrate that the plants need not be out of the way. However, the main question is the security of supply of rubbish. It will be an indictment of us as a nation if we are producing as much rubbish in 20 years' time as we are now.⁸¹

The opposition spokesperson, Jonathan Sayeed, made it clear that the Conservative Party is currently against any new incinerators being built:

The Conservative position on incinerators is clear. We wish to see a moratorium introduced on new large-scale municipal incinerators until independent British scientific evidence proves that they are safe. Tighter controls should be introduced on emissions from existing incinerators⁸²

And

⁷⁹ *ibid*

⁸⁰ *ibid*

⁸¹ HC Deb 11 December 2001 c776

⁸² HC Deb 11 December 2001 c801

British households produce enough waste to fill the Albert Hall every hour. Unless the Government rethink their approach to waste, we face the shame and expense of being branded the dirty man of Europe. We produce too much waste and the situation is getting worse. Landfill is no answer, nor is incineration a proven safe substitute. The only answer is far less waste, much more recycling, much more re-use, and a Government who talk less and begin to act with vigour.⁸³

In response Mr Meacher stated that the Government are not encouraging incineration:

I make it absolutely clear, however, that the Government are not encouraging incinerators. We are simply recognising that there may be a role for some incinerators if we are to achieve by 2016--or, with the derogation period, by 2020--a massive shift from the 1997 position in which about 85 per cent. of household waste was landfilled--that is 28 million tonnes a year--to one in which no more than 35 per cent. of 1995 levels are landfilled. However, we are not encouraging such a role.⁸⁴

c. Incineration Tax

The Select Committee Report also concluded that a tax on incineration should be put in place, comparable to the landfill tax,⁸⁵ to ensure that recycling and waste minimisation are prioritised:

We recommend that the Government introduce a tax on incineration. This tax would ensure that waste management did not simply shift from being a landfill-dominated system to an incineration-centred one. It would help shift strategic thinking from end-of-pipe solutions to materials recovery. Hazardous waste should be exempt from the tax. In the first instance, the incineration tax should be set at the same level as the landfill tax and the revenues from this tax should be hypothecated along with landfill tax revenues to help transform waste management.⁸⁶

This view was also expressed by the Advisory Committee on Business and the Environment in their report *Resource Productivity, Waste Minimisation and the Landfill Tax*. This recommended an incineration tax to prevent a direct shift from landfill to incineration as waste disposal options:

A comparison between the costs of landfill and incineration show that, where the costs of landfill are high, a shift towards incineration could result from a relatively small rise in landfill tax.

⁸³ HC Deb 11 December 2001 c803

⁸⁴ HC Deb 11 December 2001 c806

⁸⁵ The landfill tax is levied per tonne of waste sent to landfill and currently stands at £13 per tonne of active waste and £2 per tonne of inert waste. For further information see Library Note SN/BT/237 Landfill Tax.

⁸⁶ Environment, Transport and Regional Affairs Select Committee, Fifth Report: *Delivering Sustainable Waste Management*, 21 March 2001. HC 36-I Session 2000-1

The Government may wish to consider if measures to discourage other waste disposal methods, such as an incineration tax, are necessary to ensure that no such shift results from rises in landfill tax.⁸⁷

An incineration tax is also supported by the Environment Agency, who in a position statement on sustainable waste management called for the conversion of the landfill tax into a waste disposal tax, with graduated charges according to the environmental impacts of the disposal method.⁸⁸

The Performance and Innovation Unit's report on resource productivity also considered the impact of increasing the landfill tax on other routes of waste disposal:

Any rise in tax would need to be approached gradually and with long-term signals as to intended direction, so as not to burden business and force quick fix routes. Accompanying policy instruments will need to steer those involved towards more attractive alternatives. The impact of other potential measures, for example, an incineration tax on non-biodegradable waste, or fiscal instruments to encourage combined heat and power, should be subject to continual review. Considering how the planning system can best facilitate this will be key.⁸⁹

And more recently the Environment Audit Select Committee called for an incineration tax to be considered to prevent it becoming an easy option for waste disposal:

The Treasury must take advantage of the widespread consensus among both industry and environmental groups that the rate of the landfill tax should be radically increased, and the Government should not wait until 2004 to do so. To maintain appropriate differentials and prevent incineration becoming an easy option, the Treasury should explore the scope for introducing an incinerator tax.⁹⁰

However the Government position on an incineration tax is that it is currently unnecessary to encourage recycling and waste minimisation:

Ian Lucas (Wrexham): What assessment she has made of the effect a tax on incineration set at the same level as the landfill tax would have on the level of recycling carried out by local authorities in England and Wales.

The Minister for the Environment (Mr. Michael Meacher): We have set local authority statutory targets that will almost triple recycling and composting of

⁸⁷ ACBE, *Resource Productivity, Waste Minimisation and the Landfill Tax*, August 2001. <http://www.defra.gov.uk/environment/acbe/landfill/index.htm>

⁸⁸ Environment Agency Position Statement, *Responding to the Challenge of Sustainable Waste Management*, September 2001 http://www.environment-agency.gov.uk/aboutus/172311/?version=1&lang=_e

⁸⁹ PIU, *Resource productivity: making more with less*, November 2001. <http://www.cabinet-office.gov.uk/innovation/2001/resource/report/default.htm>

⁹⁰ Environment Audit Select Committee, *Pre-Budget Report 2001: A New Agenda?* 12 February 2002, HC363 Session 01/02

household waste from the 1998-99 baseline by 2005-06, as my right hon. Friend said. We have set up the waste and resources action programme to foster markets for recycled materials. We consulted on a system of tradeable permits for biodegradable municipal waste. Given those instruments, I doubt whether an incineration tax is needed at this stage to secure our main priority of diverting waste from landfill to recycling.⁹¹

The Government did, however, state recently that it would "keep under review whether there should be a tax on incineration and if so what form it should take".⁹²

The Environmental Services Association, the trade association for waste management companies, supports the Government's position:

Energy from waste is complementary to management options such as recycling and an environmentally and economically sustainable waste strategy involves a portfolio of waste management solutions.

We expect more energy from waste facilities to reduce the Country's reliance on landfill, but incineration is not the answer to the Country's problem: it is part of a co-ordinated solution. For this reason, and because we expect recycling to grow so rapidly, ESA does not agree with the introduction of an incineration tax.⁹³

d. Government Response to the Select Committee Report

The Government published its response to the Select Committee report in March 2002. The report restated Government policy on incineration and highlighted several initiatives the Environment Agency is involved with. Many of these are looking at ways to address the areas that have caused recent controversy:

80. The Environment Agency needs to deliver high quality regulation of the incineration sector and is currently working on initiatives in the following areas:

- The development and introduction of an agreed sampling and analysis protocol for municipal solid waste incinerator ash. All municipal solid waste incinerators are now required to use the protocol and report the results to the Agency, which places them on the public register;
- Ash tracking, including the development and trialing of a system to ensure that the ash generated by municipal waste incinerators can be accounted for by receipts at properly licensed or registered waste management facilities;
- Human Health issues, The Agency has already begun a research project to assess the health effects, and improve knowledge of the health impacts of

⁹¹ HC Deb 18 October 2001 c1287w

⁹² Environment, Transport and Regional Affairs Committee *Fourth Special Report Delivering Sustainable Waste Management: Government Reply to the Report of Session 2000-01 from the Environment, Transport and Regional Affairs Committee*, HC 659, 5 March 2002

⁹³ ESA, *Evidence to the House of Commons Environment Transport and Regional Affairs Sub-Committee*, September 2000, <http://www.esauk.org/pub/evidence.doc>

- waste incineration; and the development and use of Health Impact Assessments in conjunction with DEFRA and the Department of Health;
- Clarifying the Agency's locus in the Land Use Planning/Development Control system, including a clearer policy framework/guidance in relation to Regional, Structure, Unitary and Local Plans. Working with Government on influencing the revision of Government Planning Guidance ("PPGs") and Statutory Guidance on Sustainable Development. Closer working with local planning authorities over development plans and individual planning applications;
 - Waste Incineration Directive implementation, including updated technical and regulatory guidance; policy on pre-application work; permit and notice templates; and guidance on interaction with other regulatory regimes, the Waste Strategy 2000 and environmental impact issues;
 - Information for the public, including a comparison of standards with incinerators in other countries, and an explanation of the Agency's role in the regulation of incinerators; and
 - Research, including techniques for greater understanding of public attitudes and concerns, increased learning from the experience of other countries; development and refinement of technical tools to inform Regional Waste Strategies and Regional Technical Advisory Boards; and development of targeted policies for particular waste streams such as tyres.⁹⁴

The research project on health effects mentioned above is a review of all the available literature on the issue of incineration and health:

The Agency has commissioned research from a group of leading independent experts on the possible effects of a range of pollutants from incineration, and will publish this report when it has been completed. The Agency has also instigated research into risk communication and health impact assessments, and will continue to update our knowledge of incineration techniques. No waste management option, including recycling and composting, is entirely without risk to the environment and health. DEFRA will host in the spring a scientific seminar to identify waste management options where further research on health effects is required.⁹⁵

The Human Health Review of Incineration and Combustion Techniques research is expected to be published in August 2002.⁹⁶

⁹⁴ Environment, Transport and Regional Affairs Committee *Fourth Special Report Delivering Sustainable Waste Management: Government Reply to the Report of Session 2000-01 from the Environment, Transport and Regional Affairs Committee*, HC 659, 5 March 2002

⁹⁵ *ibid*

⁹⁶ HC Deb 19 March 2002 c1063w

C. Public Opinion

The National Society for Clean Air produced a report on the public acceptability of incineration in May 2001.⁹⁷ This concluded that whilst there was broad acceptance for the idea of a role for waste incineration within a general policy for waste disposal, this support often disappeared within communities when they faced the possibility of an incinerator being built in their area. The focus of local concern was found to be:

- Emissions to air, especially dioxins
- Impacts on local amenity
- Scale of the plant
- Transport impact
- Property values⁹⁸

The report recommended that new incineration plants should be developed only where there is a proven environmental need, and where this need is effectively communicated and understood by the population affected.⁹⁹

Wherever an incinerator is planned there is usually strong public opposition. Local campaigns have been mounted in places such as Sheffield, Guildford, Redhill, Hull, Maidstone, Newcastle, Kidderminster and Portsmouth. One of the recent developments in these campaigns was the failure in December 2001 of an application for judicial review of the decision of the Environment Agency to grant a permit to pollute for the proposed incinerator in Guildford. One of the arguments used by residents was that the limits set did not protect their homes and health, under the Human Rights Act. The appeal was dismissed and concluded that "the threat to health and property was not of a substantial kind and therefore the human rights challenge failed".¹⁰⁰ Soon after this, in December 2001, Surrey County Council turned down the proposal for the Guildford incinerator. The main reasons were the impact on local residents and the character of the local area, the effect on the River Wey, and on adjoining landscape and Green Belt.¹⁰¹

⁹⁷ NSCA, *The Public Acceptability of Incineration*, May 2001

⁹⁸ *ibid*

⁹⁹ *ibid*

¹⁰⁰ Dominic John Furness, Alyson Jane Furnes, *Guildford Borough Council v Environment Agency & Thames Water Services Ltd*, QBD (Turner J) 17 December 2001

¹⁰¹ Surrey County Council Press Release, *Decision reached on Slyfield energy from waste*, December 2001

VII Planning for Incinerators

Guidance to local authorities from Government on the issue of waste management is not prescriptive. The Government has set national targets for maximum amounts of biodegradable waste going to landfill and statutory targets for local authorities to increase recycling of MSW, but the decision on how these targets are achieved is the responsibility of local authorities in their various waste management and planning roles.

A. Waste Planning Authorities

In their role as waste planning authorities (WPAs) local authorities are responsible for preparing local plans in which potential sites for new waste management facilities are identified:

It is the responsibility of WPAs to ensure that there is an adequate framework in their development plans to enable the waste management industry to establish appropriate waste management facilities, in a way which meets the objectives of sustainable development.¹⁰²

WPAs must plan for a provision of waste management facilities that is consistent with forecasts of local and regional requirements, as well as other planning consideration. The Government has set out four principles of waste management on which they wish to see future WPAs waste management decisions based:

- Best Practicable Environmental Option (BPEO)
- Regional Self-Sufficiency: Most waste should be treated or disposed of within the region in which it is produced.
- Proximity Principle: Waste should generally be managed as near as possible to its place of production, because transporting waste itself has an environmental impact.
- The Waste Hierarchy¹⁰³

When questioned on the matter, Ministers consistently reply that building new incinerators is a decision for local authorities that must be taken in the context of local waste management plans:

Mr. Tony Lloyd: To ask the Secretary of State for the Environment, Transport and the Regions what plans he has concerning the location of future incinerators.

Mr. Mullin: The location of facilities is a matter for local authorities. Suitable sites for new incineration plant will be determined by local planning authorities,

¹⁰² DTLR, PPG No 10 *Planning and Waste Management* <http://www.planning.dtlr.gov.uk/policy.htm>

¹⁰³ *ibid*

in line with the decisions of regional planning bodies. Planning policy guidance on waste management in England is set out in "Planning Policy Guidance Note 10: Planning and waste management".¹⁰⁴

And

Mr. Damian Green: To ask the Secretary of State for Environment, Food and Rural Affairs what plans the Government have to introduce a moratorium on new municipal incinerators; and if she will make a statement.

Mr. Meacher: The Government have no plans to introduce a moratorium on new municipal incinerators. The choice of waste facilities in an area is for local authorities to make in consultation with their local communities, taking into account the waste hierarchy, which places recycling and composting above incineration with energy recovery, and the need to achieve the best practicable environmental option.¹⁰⁵

This was again restated in the Government response to the Select Committee report *Delivering Sustainable Waste management*:

The choice of waste facilities is a matter for local authorities in consultation with their local communities. However, where it does not make sense to recycle or compost waste, consideration may be given to the recovery of energy from waste. Energy-from-waste facilities should be small enough that they do not compete with recycling, and should include Combined Heat and Power (CHP) - where heat is used to produce electricity and provide heating to homes or businesses - wherever possible¹⁰⁶

B. Regional Strategies

The Government wants to see regional strategies developed for meeting likely demands for waste management and disposal. To do this it has asked each of the eight planning regions in England to set up Regional Technical Advisory Bodies, with the aim of producing draft waste strategy for the region.

The strategies for each region will need to be compared to ensure that, together, they will meet expected national requirements. Regional considerations should be reflected in WPAs' waste development plans.¹⁰⁷

¹⁰⁴ HC Deb 21 June 2000 c203w

¹⁰⁵ HC Deb 2 July 2001 c47w

¹⁰⁶ Environment, Transport and Regional Affairs Committee *Fourth Special Report Delivering Sustainable Waste Management: Government Reply to the Report of Session 2000-01 from the Environment, Transport and Regional Affairs Committee*, HC 659, 5 March 2002

¹⁰⁷ DTLR, PPG No 10 *Planning and Waste Management* <http://www.planning.dtlr.gov.uk/policy.htm>

They are likely to include targets for landfill and recycling and will also need to identify the need for different types of waste facilities that may be required and potential locations. These will then be included in future Regional Planning Guidance.¹⁰⁸

C. Municipal Waste Management Strategies

Waste Collection Authorities and Waste Disposal Authorities are required to jointly develop a Municipal Waste Management (MWM) Strategy for their area. The aim of MWM Strategies is to set out the framework within which authorities will manage their municipal waste. The Government recognises that they will have to be individually tailored to meet the requirements of each authority, but it also states that:

All MWM Strategies [...] will need to demonstrate how the authorities will meet the objectives and targets in the *Waste Strategy 2000*, in particular the statutory obligations to increase recycling and composting.

A strategy should therefore contain:

- High level objectives for the service including statutory performance standards, and a time scale for achieving these;
- A review of outcomes against previous targets or plans, and factors which have caused divergence;
- Identification and analysis of available options.¹⁰⁹

On the issue of waste incineration with energy recovery the guidance states:

Waste Strategy 2000 notes that energy recovery will need to play a part in local and regional solutions developed over the next few years. This could include incineration with energy recovery, as well as other technologies such as anaerobic digestion, pyrolysis and gasification. Where energy from waste solutions are considered, the MWM Strategy should demonstrate that all opportunities for waste reduction, reuse, recycling and composting have been considered first. The potential for incorporating heat and power (CHP) technology should always be considered. Care must be taken to ensure that energy recovery plants are appropriately sized to avoid crowding out recycling. MWM Strategies for areas which are considering energy from waste plants should set out how these issues have been addressed.

Where authorities have plans to explore different or innovative recovery methods, these should be described in the MWM Strategy. The guidance sees such new methods as

¹⁰⁸ 'Waste planning comes of age: the regional picture on rubbish', *Ends Report* 311, December 2000

¹⁰⁹ DEFRA, *Guidance on Municipal Waste Management Strategies*, 13 March 2001
<http://www.defra.gov.uk/environment/waste/management/guidance/mwms/index.htm>

becoming increasingly important where they are proved safe, reliable, competitive and acceptable on environmental and public health grounds.¹¹⁰

D. Planning Process

The Government Planning and Policy Guidance Note 10 *Planning and Waste Management*¹¹¹ sets out guidance on where waste management facilities, including incinerators, should be sited and highlights the importance of managing waste at a regional level. However it does not favour one management option over another. The position relating to incineration was explained as follows:

Incineration

Bob Russell: To ask the Secretary of State for Environment, Food and Rural Affairs what her policy is on specifically requiring county councils to include incineration in their waste plans.

Mr. Meacher: County councils are not specifically required to include incineration in their waste plans. The Government are committed to maximising waste reduction, recycling and composting and minimising the need for incineration and landfill.

However Government policy, as set out in Planning Policy Guidance Note 10 (PPG10), states that waste planning authorities should not seek to prohibit the development of particular types of waste facility unless they are confident that adequate alternative facilities will be available in their area.¹¹²

This could mean that planning permission for an incinerator may be difficult to refuse because a local authority does not favour this waste disposal option, unless other ways of disposing of the waste are available.

Part of the planning process for a waste incinerator is likely to be the completion of an Environmental Impact Assessment (EIA), under Schedule 2 of the *Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999*. Guidelines for the regulations state that EIAs are likely to be required for proposed incinerator sites where new capacity is created to hold more than 50,000 tonnes of waste per year, or to hold waste on a site of 10 hectares or more.¹¹³

In addition to planning permission, a new MSW incineration facility will require a permit to emit pollutants under Pollution Prevention and Control Regulations:¹¹⁴

¹¹⁰ *ibid*

¹¹¹ DTLR, PPG No 10 *Planning and Waste Management* <http://www.planning.dtlr.gov.uk/policy.htm>

¹¹² HC Deb 16 October 2001 c1216w

¹¹³ DTLR, *Environmental Impact Assessment: A Guide to Procedures*, February 2001, <http://www.planning.dtlr.gov.uk/eia/guide/index.htm>

¹¹⁴ *The Pollution and Prevention and Control (England and Wales) Regulations 2000*, SI 1973

A new facility such as an incinerator requires both planning permission and an IPC or PPC authorisation, but the legislation does not prescribe the order in which such permissions are to be obtained, or that applications should be made concurrently. The general practice has been to obtain planning permission first, to be followed later by more specialised regulatory consents.¹¹⁵

However the Environment Agency does encourage parallel applications and this was endorsed in the Planning Green Paper, arguing that both developers and the community could benefit from greater certainty if those proposing facilities were to "apply for pollution control authorisation and planning permission at the same time."¹¹⁶

a. Large Versus Small Incinerators

Small-scale incinerators are considered to be those that handle between 30,000 to 100,000 tonnes per annum (tpa). Larger incinerators may have a capacity of up to 500,000 tpa.

The costs involved in building incinerators are directly related to the size of the plant, with larger plants being proportionally more expensive. Costs for commissioning a large incinerator with a capacity of around 400,000 tpa have been estimated to be in the region of £90 million in 1996 prices compared with £30 million for a 100,000 tpa plant.¹¹⁷ However costs per tonne of waste disposed of (gate fees) are reduced as the size of an incinerator increases. Reduced gate fees for larger incinerators only apply if they function at full capacity and do so over a long period of time, usually calculated at 20-30 years. As a result of this local authorities may have to guarantee a certain level of waste being available over a considerable period of time. This, it is argued, may greatly reduce the incentive to increase levels of recycling (see next section). In addition, larger incinerators will receive waste from a wider area, which can come into conflict with the proximity principle.

The Waste Strategy and planning guidance both encourage the use of the proximity principle when it comes to waste disposal. This requires waste to be disposed of as close to source as possible, with the aim of reducing the environmental impact of transporting it over long distances and encouraging communities to accept responsibility for the waste they themselves produce. This would support the construction of smaller incinerators dealing with locally produced waste, which if built as a combined heat and power plant (CHP) would then be able to produce electricity and heat to be used locally.

Biffa Waste summarised to the Select Committee enquiry on *Delivering Sustainable Waste Management* some of their arguments against larger incinerators:

Volume 2 of the Strategy document was very good insofar as it painted a much broader picture of the available technologies in this "bucket" of incineration. We

¹¹⁵ ENDS Report 325, *Incinerator authorisation held valid*, February 2002.

¹¹⁶ *ibid*

¹¹⁷ Williams, P.T, *Waste Treatment and Disposal*, 1998, John Wiley & Sons

are very dubious about the role of very large incineration plants, basically because there does not seem to be much technical or economic sense to us. I am not going to comment about the pollution issues because I am not qualified. There does not seem to be much technical or economic justification in building plants that generally cost around £80 to £100 million where the operators freely acknowledge that 15 to 20 per cent of the material going into that plant will not ignite. That is basically aggregates, ferrous and non-ferrous products and water. There is an awful lot of water going into these plants. It seems to me that it is pretty daft to actually build something that is already 20 per cent bigger than it needs to be, because you just have to shovel all this stuff through that goes on a big heating journey. The second issue is around the financial one. We believe that the key to this whole energy debate is basically about front-end sortation. If you want to adopt an approach which implies the precautionary principle you should put all of your resources into quality control in the front-end segregation of materials.¹¹⁸

b. Incineration and Recycling

There has been general concern expressed about the issue of planning permission for incinerators and whether this should be granted if the result would be to divert waste from re-use or recycling, and affect waste reduction targets.

The issue of waste being diverted from recycling to fulfil energy from waste contracts was mentioned by Angela Eagle in response to a PQ in February 1998:

The Department is also shortly to issue revised guidance to local authorities on the preparation and revision of recycling plans. I hope that all local authorities will look at all the available options for managing waste in developing an integrated municipal waste management strategy with other authorities, the public, the private and voluntary sectors. Recycling is to be preferred to incineration with recovery if and when it represents the best practicable environmental option. Equally, incineration with energy recovery is generally likely to be preferable to disposal.

That guidance also advises authorities developing integrated strategies that the high capital costs of energy from waste plants generally require long-term waste contracts to be agreed. Local authorities considering energy from waste will therefore wish to guard against over-reliance on this option, and will wish to take a view on likely future developments in waste management practices and technology. In particular, they will wish to ensure that the use of energy from waste plants does not divert waste from recycling and composting, and, indeed, allows scope for increases in recycling and composting activity.¹¹⁹

¹¹⁸ Peter Jones, Director, Biffa Waste Services Ltd, Minutes of Evidence, Environment, Transport and Regional Affairs Select Committee, Fifth Report: *Delivering Sustainable Waste Management*, 21 March 2001. HC 36-II Session 2000-1

¹¹⁹ Hc Deb 13 February 1998 c415-6w

Planning Policy Guidance note 11 on Regional Planning Guidance (RPG), published in October 2000, in the section dealing with waste, again states the importance of moving waste up the hierarchy:

13.4 In particular RPG should:

- set regional waste management capacity and disposal targets, including for the recycling and recovery of waste, to promote sustainable waste management, waste minimisation and alternatives to landfill. The targets should be consistent with local authorities achieving statutory performance standards for household waste recycling and composting. In general they should promote the moving of waste up the hierarchy of treatment methods (reduction, reuse, material recycling and composting, energy recovery, and disposal without energy recovery);
- set indicators for the measurement of progress against these targets, which can be regularly monitored;¹²⁰

The Guidance also goes on to state that recycling targets will be included in the planned Public Service Agreements (PSA).¹²¹ These are currently being piloted in several local authorities. The proposed target for waste that local authorities will have to meet to comply with their PSAs is to enable 17% of household waste to be recycled or composted by 2004.

c. Private Finance Initiatives

New guidance was issued in October 2000 by the DETR on PFI for waste projects. This changed the rules for applications, emphasising the importance of recycling, and stated:

proposals including incineration must demonstrate that all opportunities for recycling have been considered first and that there is no barrier to the future development of recycling. Schemes should include proposals for combined heat and power where possible.¹²²

In response to the Select Committee report on sustainable waste management the Government further clarified the position:

We anticipate [...] that PFI funding will help to fund long-term improvements in recycling and composting. There is no reason why a PFI bid coming forward

¹²⁰ DETR, *Planning Policy Guidance Note 11: Regional Planning Guidance*, October 2000
<http://www.planning.detr.gov.uk/ppg/index.htm>

¹²¹ *ibid*

¹²² DETR Press Release, *Recycling key to future PFI waste applications*. 22 September 2000
<http://pipe.ccta.gov.uk/coi/coipress.nsf>

should necessarily include incineration. The Government has already approved one large scheme which includes no energy from waste.¹²³

VIII Alternatives to Incineration

The generally held view by the Government, most local authorities and the waste industry is that incineration is a necessary part of waste management in the short to medium-term future. The Prime Minister made this clear in a recent response to a PQ:

Incineration

Norman Baker: To ask the Prime Minister, pursuant to his oral answer to the hon. Member for Lewes of 4 July 2001, Official Report, column 256, on what evidence he bases his statement that incineration is a cheaper option than recycling in terms of waste dispersal.

The Prime Minister: The Government's overall strategy for waste is first and foremost to cut waste and, secondly, to recycle, and only then to consider incineration and other options lower down the waste hierarchy. We are purchasing a range of measures intended to support recycling. These include the £40 million Waste and Resources Action Programme to overcome market barrier to re-use and recycling, increase in the Landfill Tax, and increased financial support for recycling through Spending Review 2000 and the next round of the New Opportunities Fund.

Relative costs of incineration and recycling are given in the Government's Waste Strategy 2000, Part 2 (appendix C), copies of which have been placed in the Library. This details the independent research which shows incineration is less expensive than recycling under a wide range of conditions.¹²⁴

Some councils are looking for alternative ways of diverting waste from landfill and environmental groups continue to campaign against incinerators as a form of municipal waste management.

For example, Hertfordshire councils have published a draft waste strategy, after public consultation, which does not include conventional incineration. Recycling targets have been set at 50% by 2010 and novel technologies such as biological drying plants are being investigated in conjunction with Shanks, a waste management company. The plants take residual waste, which is shredded, treated biologically and then dried. Steel and aluminium is then removed for recycling, stones and glass are separated for use as aggregate and the remaining dry fraction is either landfilled or used as fuel. Another form

¹²³ Environment, Transport and Regional Affairs Committee *Fourth Special Report Delivering Sustainable Waste Management: Government Reply to the Report of Session 2000-01 from the Environment, Transport and Regional Affairs Committee*, HC 659, 5 March 2002

¹²⁴ HC Deb 10 July 2001 c453w

of treatment also being considered by Hertfordshire involves waste being sterilised by using steam, which cleans metal and plastics and removes labels. These are then separated and sorted. Organic matter and paper result in a pulp that can be used as fuel.¹²⁵

The East London Waste Authority has recently given Shanks preferred bidder status for a 25 year waste disposal contract that does not include incineration. The plans include the construction of six mechanical/biological treatment plants to shred, dry and compost waste after removing any recyclables. In addition to compost they will produce refuse-derived fuel (RDF).¹²⁶

Several councils are considering new technologies for burning waste, such as pyrolysis or gasification. Liverpool and Forth Valley in Scotland, have rejected mass burn incineration in favour of pyrolysis. Pyrolysis is a more efficient form of incineration, which results in a reduced amount of emissions of pollutants and particulates into air.

Greenpeace published a guide for local authorities in November 2001 called *How to comply with the landfill Directive without incineration: A Greenpeace blueprint*.¹²⁷ The guide claims that a combination of kerbside recycling and mechanical-biological treatments would result in a reduced amount of stabilised waste that could be disposed of to landfill. Greenpeace feels this is preferable to incineration as it does not create a need for waste as fuel and it can also compete with incineration on the amounts of final waste (ash in the case of incineration) produced which needs to be disposed of. According to the *ENDS Report* Biffa has reviewed the guide and agrees that the solutions put forward are practical.¹²⁸

a. *Is Energy from Waste a Renewable Resource?*

Under the *Utilities Act 2000* renewable energy is described as sources of energy other than fossil fuel or nuclear fuel. A stricter definition of renewable energy, as that given by the UK Renewable Energy Advisory Group (REAG), would not include energy from waste (EfW), as this defines it as the term used to cover those energy flows that occur naturally and repeatedly in the environment and can be harnessed for human benefit.¹²⁹ Waste does not occur naturally nor can significant proportions of it, particularly plastics, be used repeatedly to provide energy.

¹²⁵ 'Councils and waste firms seek alternatives to incineration', *ENDS Report* 319, August 2001.

¹²⁶ 'East London opts for 'bio-MRFs'', *ENDS Report* 327, April 2002

¹²⁷ Greenpeace, *How to comply with the landfill Directive without incineration: A Greenpeace blueprint*. November 2001, <http://www.greenpeace.org.uk/MultimediaFiles/Live/FullReport/4478.pdf>

¹²⁸ 'Guide for councils to avoiding incineration', *ENDS Report* 322, November 2001.

¹²⁹ REAG (1992), *Report to the President of the Board of Trade, Energy paper No. 60*, HMSO November. Renewable Energy Advisory Group.

Following extensive consultation on the renewables obligation, the Government decided that in the case of incineration only energy recovered from the biodegradable fraction of industrial and municipal waste will be considered renewable and, only when being used as fuel on its own. However, in the case of newer technologies, such as pyrolysis, gasification and anaerobic digestion of biodegradable waste, the biodegradable fraction of waste used as fuel will be eligible. This has been set out in the *Renewables Obligation Order 2002* and was summarised by the Industry and Energy Minister, Brian Wilson, as follows:

In line with UK waste strategy, we have excluded the incineration of mixed waste. However, we are boosting the development of advanced technologies such as pyrolysis and gasification. Electricity generated from mixed waste using these technologies is eligible. Those exciting technologies have a huge potential and I believe that it is right to encourage their development through the obligation. Only the proportion of electricity attributable to the biodegradable element—wood and paper, plants and animal material—is eligible. That is consistent with the UK waste strategy and the hierarchy of waste disposal, as well as with the recent directive on the promotion of renewables in the electricity market.¹³⁰

IX Current Plans and Projected Requirements

The following is a list of MSW incinerators that are currently under construction, planned or in the process of applying for planning permission in England and Wales. The list, compiled from a variety of sources, is up to date as of April 2002.¹³¹ The details within are as accurate as possible given the lack of a central register of information.

Plant name	District	Capacity (tpa)
Under Construction		
Kirklees	Kirklees	135,000
Chineham,	Basingstoke and Deane	90,000
Crymlyn Burrows	Neath Port Talbot	35,000

¹³⁰ Third Standing Committee on Delegated Legislation, *Draft Renewables Obligation Order 2002*, 6 March 2002, <http://pdvnsco.parliament.uk/homepage.html>

¹³¹ ESA, *Current and Projected EfW Capacity in UK as at April 2002*, April 2002
 HC Deb 15 October 2001 c1056w
 Sheffield City Council., <http://www.sheffield.gov.uk>, 31 April 2001
 BBC News online, <http://news.bbc.co.uk>

Plant name	District	Capacity (tpa)
Approved but not yet constructed		
Allington	Maidstone	500,000
Colnbrook, Slough	Slough	400,000
Marchwood	New Forest	165,000
Grimsby	North East Lincolnshire	55,000
South Portsmouth	Portsmouth	165,000
Cleveland B	Stockton-on-Tees	130,000
Capel, Surrey	Mole Valley	110,000
Subject to Planning		
Belvedere	London Borough of Bexley	585,000
Edmonton B	London Borough of Enfield	300,000
Guildford	Surrey County Council	225,000
Goole	East Riding of Yorkshire	400,000
Wrexham	Wrexham	60,000
Sheffield	Sheffield City Council (to replace existing facilities)	225,000
Planning Refused		
Redhill	Reigate and Banstead Borough Council	215,000
Ridham Dock	Swale District Council	225,000
Kidderminster	Worcestershire County Council	150,000
Hull	City of Hull	165,000
Belfast	(Planning unresolved)	200,000
Guildford	Guilford	225,000

The Energy from Waste Association estimated that, as of December 2000, the sum total of incineration capacity including all proposed and operational incinerators was 6,911,000 tpa. Even if approved many of the proposed incinerators will not be operational for many years, as the average time for planning approval to be granted for an incinerator is estimated at seven years.¹³²

There has been a great deal of debate between supporters and opponents of incineration regarding how many will be required. This was highlighted in the Select Committee Report:

102. In a slightly curious situation, those who argue for more incineration project fewer numbers of smaller incinerators whilst those who are opposed to the technique told us that there would be large numbers of high-capacity incinerators built. Robin Murray told us that:

¹³² Environment, Transport and Regional Affairs Select Committee Fifth Report, *Delivering Sustainable Management*, Vol 1, HC 36-I, Session 2000-01, 14 March 2001.

"The most likely one that fits the model is 112 incinerators. If you think that there are just over 130 waste disposal authorities, from my experience of disposal authorities ... the great majority are going for plans that are reflected in the Strategy, which are incineration centred."

Peter Jones of Biffa Waste Services Ltd also suggested that around 100 incinerators would be built. Against these figures, the Energy from Waste Association described the projection of up to 166 new incinerators as a "gross exaggeration" and went on to suggest that a maximum of 40-50 plants would be constructed by 2015.¹³³

The Environment Agency published Strategic Waste Management Assessments (SWMAs) for London, Wales and the eight English Regions in November 2000. These included information on waste arising, flows of waste within and between regions and waste disposal facilities. In addition they included forecasts of new facilities that may be required to meet Landfill Directive targets. Two scenarios were developed: the first, an energy from waste strategy with waste growth predictions of 1% or 3%; the second, a recycling led approach, again with the same predicted growths. The Agency estimated that the required number of incinerators by 2020 could be anywhere between 21 and 69, each with an average capacity of 300,000 tpa. *ENDS Report* included calculations of numbers of smaller (200,000 tpa) incinerators, which could be as many as 104.¹³⁴

Table 6

New municipal incinerators, Environment Agency projections

	Energy from waste led		Recycling-led	
	1% Growth	3% Growth	1% Growth	3% Growth
North West	7	11	4	7
North East	2	4	1	2
Yorkshire and the Humber	4	7	2	4
West Midlands	3	6	1	3
East Midlands	2	5	2	4
Eastern	4	7	2	5
South East	6	11	4	8
Greater London	6	11	2	6
South West	4	7	2	4
Total (300,000 tpa plant)	38	69	21	44
Total (200,000 tpa plant)	57	104	32	66

Source: *ENDS report 311 Waste planning comes of age: the regional picture on rubbish, December 2000*

¹³³ *ibid*

¹³⁴ 'Waste planning comes of age: the regional picture on rubbish', *ENDS Report 311* December 2000.

The debate about the number of incinerators that may be required to meet demand in the next twenty years is very much linked to the debate about the extent that waste production can be minimised and re-use and recycling can be maximised. This is exemplified by the estimates made in the SWMAs. The Environment Agency assumed a maximum possible recycling rate of 42% of MSW by 2010. An *ENDS Report* article was critical of this:

Given the 9% recycling rate in England and Wales this represents a significant challenge. Nevertheless some English local authorities are already facing statutory recycling targets of 40% by 2005/6.

It is well to remember that Germany, Austria and Netherlands have already exceeded the Agency's "maximum" recycling level. In 1996, Germany recycled or composted 48% of municipal waste.

Furthermore in modelling the Agency has assumed that only 60% of householders will participate in recycling schemes. A higher participation rate would lead to rates approaching those in Germany, further reducing the amount of incineration required. And growth in waste of less than 3% would reduce the amount of incineration required even further.¹³⁵

¹³⁵ *ibid*