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Stewarding the Earth's Resources

An occasional bulletin for the church about waste

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The broader picture on waste incinerators and other new technologies that have the potential to replace incinerators

Abstract

Waste managers have the difficult task of working with public expectations that increased recycling will make all our household waste disappear in an eco-friendly way. Despite frequent opposition from community and lobby groups, waste incineration is very attractive as a tried and tested, large scale alternative to landfill for disposal of this waste.

A new European Parliament Directive of June 2008 means that, in future, the new heat-treatment waste management technologies, such as gasification and anaerobic digestion will meet the efficiency criteria set out in the Directive more easily than waste incineration, and that those incinerators that are put forward for approval in future will have to provide Combined Heat and Power (CHP).

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1. Introduction

Waste managers have the difficult task of working with public expectations that increased recycling will make all our household waste disappear in an eco-friendly way. But the quantities of waste to be managed are very large, and Defra's statistics show that recycling currently accounts for less than 50% of all household waste. Waste incineration is very attractive as a tried and tested, large scale alternative to landfill for disposal of this waste. But waste incinerators are frequently opposed by community and lobby groups.

A recent European Parliament Directive defines MSW incineration as 'recovery', rather than as 'disposal', provided specified energy efficiency standards are met. This means that, in future, new Energy-from- Waste plants will be expected to generate Combined Heat & Power – a condition that only one of the current twenty three existing MSW incinerators in the UK fulfils. This encourages new technologies in place of MSW incinerators.

Parish clergy and other church people sometimes speak out against new waste developments without being fully informed about the issues.

2. What is a municipal solid waste incinerator?

A municipal solid waste incinerator is run by a waste disposal authority or its contractor to burn substantial quantities of municipal solid waste (MSW).

Most MSW incinerators use the burning process to generate electricity which is supplied to the National Grid. Some have the potential to supply heat, usually in the form of hot water, to nearby developments.

The potentially polluting aspects of an MSW incinerator are closely monitored and controlled by the Environment Agency.

In July 2008 the 'UK Without Incineration Network' (UKWIN) published an online map which shows the location of all twenty three existing MSW incinerators in the UK.

MSW is the waste that waste collection authorities collect from households plus a limited number of other sources (some commercial waste, street sweepings, municipal parks waste etc). The largest component of MSW is the rubbish put out by households as 'black bin bag' or 'dustbin' waste. A large amount of 'black bin bag' / 'dustbin' waste could be recycled or composted, or could otherwise have value recovered from it by various processes, but this depends on the existence of both the necessary infrastructure and a favourable market. In practice, large amounts of MSW must be disposed of: landfill is increasingly unattractive for this, although landfill will remain the best waste management method for some types of material.

As waste authorities realise that decline in use of landfill will not be matched by an equivalent increase in recycling, they are increasingly looking to construct one or more MSW incinerators in their area.

One such plant that has recently been granted planning permission, and which was recently challenged unsuccessfully in the courts is at Newhaven, in East Sussex. See the link on page 5 below.

Conclusion on 'What is a MSW incinerator'?

These are large scale waste burners with ancillary benefits of electricity and heat generation.

3. The Combined Heat & Power opportunity in MSW incinerators

The current generation of MSW incinerators generates electricity to the National Grid, leading to the term Energy from Waste (EfW) plant being applied to most MSW incinerators. Some also have the potential to provide heat, typically in the form of hot water, to neighbourhood or other building heating schemes – known as Combined Heat and Power (CHP).

Wikipedia states that only one of the MSW incinerators operating in the UK at present – at Sheffield – supplies heat to a community heating scheme, in addition to generating electricity.

Although the SELCHP MSW incinerator in south London was designed as 'South East London Combined Heat and Power', the CHP component of the plant has not been installed. The Combined Heat and Power Association website states that SELCHP now hopes to develop a district heating system to become a CHP plant.

An example of the potential of MSW incineration with CHP is found in the PFI Project Outline Business Case (October 2007) of the South Tyne & Wear Waste Management Partnership. In an analysis of options for the treatment of 'residual waste' (ie. waste that has not been recycled or composted and that remains to be disposed of) in the South Tyne and Wear area, consultants ERM included MSW incineration with CHP as one of the nine options. A comprehensive analysis of the environmental impact of the nine options shows that MSW incineration with CHP has the best environmental performance. When other factors are taken into account (including costs and deliverability / bankability), the highest scoring option is MSW incineration with CHP, with MSW incineration with CHP, autoclave and aerobic digestion scoring close behind. (See pages 45 – 74 of the PFI Project Outline Business Case).

The full list of options considered includes new technologies that can provide energy from waste, as well as MSW incineration with or without CHP, as follows:

- Anaerobic Digestion (AD) of food wastes. This is the degradation of waste in an enclosed vessel in the absence of air. AD is more efficient at treating putrescible wastes (such as food wastes) than non-putrescible wastes.
- AD of all wastes. (See above).
- Mechanical Biological Treatment (MBT) with output of Refuse Derived Fuel (RDF) for use in an off-site EfW plant. MBT combines mechanical separation of types of waste with biological treatment. The resulting RDF is a material that can be burned in an EfW plant.
- MBT with output going to landfill.
- Autoclaving. This is a heat treatment process that is assumed to produce RDF as an output.
- EfW (ie. incineration)
- Advanced Thermal Treatment (Gasification). This is a heat-treatment process in which waste is heated to produce a gas that then drives a turbine to generate electricity. This is more complex than incineration: it is claimed to reduce emissions to air.
- Aerobic Digestion. This is essentially the composting of wastes in air.
- EfW (ie. incineration) with CHP.

In the South Tyne & Wear Waste Management Partnership PFI Project Outline Business Case ERM recommends: "The delivery of other EfW solutions through Anaerobic Digestion or Refuse Derived Fuel will also benefit greatly through the optimisation of the energy benefit and thus CHP should be a central aspect of the process if they can demonstrate commercially viable proposals".

The Combined Heat and Power Association lists case studies of CHP schemes but none of these is fuelled by energy from waste. See weblink below.

The Revd Dr Andrew Craig writes: 'The Swedes distribute energy differently from us, with less mains gas (and individual heating of houses and offices) and much more distributed hot water from CHP. What caught my attention was that they said that hot water can be piped up to 50km. They don't rely on one source of hot water, but on 4-5 on a mains system, so the hot water doesn't stop when the plant shuts down. This has obvious planning (and theological) implications for new infrastructure and commercial and domestic development on a sub-regional scale, using low carbon distributed heat from a number of CHP sources - communal heating based on hot water in place of individual heating based on distributed gas or electricity. There are, of course, big financial and planning implications for setting up this kind of infrastructure'.

The Revd Dr Craig collaborates with Jon Hale in the production of the quarterly publication Christian Stewardship Sustainable Development on www.earthresources.org.uk. He works for the Tees Valley Joint Strategy Unit; he is policy officer of the Local Authority Recycling Advisory Committee (LARAC); and is a waste adviser to the Local Government Association.

Conclusion on CHP

The case for CHP is well-made, but one wonders why only one existing MSW incinerator is a CHP plant. This is probably due to a number of factors including: lack of political will; economic considerations; and difficulties if a MSW incinerator is situated at a distance from nearby potential users of heat from the incinerator. In future there will be potential for new technologies to enable energy to be generated from waste in addition to or, in replacement of, MSW incinerators.

4. What is the case against MSW incinerators?

The three main arguments advanced by opponents of MSW incinerators are:

- **The carbon emissions from incineration**. See the links on page 5 below to the Friends of the Earth briefing Up in Smoke and to UK WIN's case against.
- **The risk of pollution to air from the burning process.** See the links on page 5 below to the Friends of the Earth briefing Up in Smoke and to UK WIN's case against.

- **The discouragement to increased recycling and composting of waste** when an incinerator plant needs to be kept supplied with a certain tonnage of MSW on a daily basis.

Probably the most persuasive argument against is that the incineration of waste leads to immediate release of carbon dioxide, whereas as landfill sequesters carbon – it stores it under the ground. This objection is overcome by using highly efficient processes to convert waste into energy, so that it displaces less carbon efficient energy.

In principle, 'closed loop' recycling (recycling that takes a waste material and processes it for re-use for the same purpose eg. recycling plastics food & drinks containers for re-use for the same purpose) is better for the environment than either incineration or landfill. See weblink below.

The website www.letsrecycle.com publishes the UK WIN map of current and proposed incinerators (referred to above) and makes its own case against waste incineration. (See link on page 5 below.) But it also publishes responses from Defra and the Chartered Institution of Wastes Management – both key players in waste.

Defra said:

> "it did indeed take recycling factors into consideration where applicable and that the adoption of incineration need not damage recycling rates and targets. Energy from waste need not reduce recycling and composting rates. In fact recent research from the German federal environment agency suggests that a higher rate of incineration goes hand in hand with higher recycling and composting rates."

The Chartered Institution of Wastes Management Chief Executive Steve Lee said:
"There is plenty of evidence from mainland Europe that high recycling rates can sit side by side with higher recycling rates of EfW than we currently have here in the UK"

Conclusion on the case against MSW incinerators

Defra and the CIWM refute the frequently-made argument that recycling and incineration are inimical to each other.

Friends of the Earth, UK WIN and other lobby groups continue to be concerned about environmental pollution aspects of incineration.

5. New European Parliament definition of incineration sets high standards for new facilities

In June this year the European Parliament adopted a Directive which includes the new definition of MSW incineration as 'recovery', rather than as 'disposal'. But the 'recovery' classification only applies if specified energy efficiency standards are met. The aim is to ensure that carbon emissions from incineration do not exceed any carbon emissions if the incinerated waste was to be managed / disposed of in another way.

It is now clear that these standards mean that for MSW incineration, only some of these installations that generate heat in CHP, as well as electricity, will be able to be classified as 'recovery'. This would exclude all the MSW incinerators currently operating in the UK except for one - they will continue to be classified as 'disposal' operations.

It is quite challenging to make MSW incinerators meet the new criteria, whereas new technologies such as gasification and AD meet the efficiency criteria more easily. This has further implications for planning new EfW plants, which will now need to be built near developments (residential, commercial or industrial) that are able to use the heat they generate.

In simple terms this means encouragement for new technologies such as gasification and AD, and it means that an MSW incinerator with CHP is more likely to be granted planning permission than one without.

Conclusion on new European Parliament definition of incineration

The desirability of CHP, which is shown in the ERM study made in 2007 for the South Tyne & Wear Waste Management Partnership, is now affirmed by the new European Parliament Directive.

6. Conclusion

Proposals will continue to be made for the construction of new MSW incinerators because waste authorities need to plan for management of the large quantities of MSW that will need to be diverted from landfill. The new EC Directive means that these plants will have to include CHP.

We may envisage a future in which there will also be many, relatively small Energy-from-Waste plants (compared with existing MSW incinerators), each located adjacent to a development that uses hot water generated by the waste plant. Each plant will also feed power to the National Grid. These new plants will use new technologies such as AD, gasification, autoclave and aerobic digestion.

In addition, there will continue to be waste incinerators that burn MSW plus Refuse Derived Fuel.

At the same time, there will be continual growth in the number and types of recycling, recovery and composting operations.

Links, sources and references

Defra's Municipal Waste Management Statistics:
http://www.defra.gov.uk/environment/statistics/wastats/bulletin08qtr.htm

Recent unsuccessful legal challenge to proposed MSW incinerator at Newhaven, East Sussex: http://www.eastsussex.gov.uk/environment/planning/applications/erf/default.htm

Wikipedia list of incinerators in the UK:
http://en.wikipedia.org/wiki/List_of_incinerators_in_the_UK

South Tyne & Wear Waste Management Partnership:
http://www.gateshead.gov.uk/DocumentLibrary/Environment/Strategies/joint_wastestrategy/obc.pdf

ERM: http://www.erm.com/erm/main.nsf/pages/homepage?opendocument

Combined Heat and Power Association: http://www.chpa.co.uk/index.htm

Friends of the Earth briefing: Up in Smoke:
http://www.foe.co.uk/resource/media_briefing/up_in_smoke.pdf

Closed Loop Recycling plant:
http://www.letsrecycle.com/do/ecco.py/view_item?listid=37&listcatid=217&listitemid=10133

UK Without Incineration Network: http://www.ukwin.org.uk/map/

www.letsrecycle.com case against MSW incinerators:
http://www.letsrecycle.com/do/ecco.py/view_item?listid=37&listcatid=217&listitemid=10222

Reduce the use: Energy from Waste (the case for MSW incinerators):
http://www.reducetheuse.co.uk/Page/Energy/Energy%20from%20waste.htm

European Parliament Waste Directive (June 2008):
http://www.europarl.europa.eu/news/expert/infopress_page/064-31746-168-06-25-911-20080616IPR31745-16-06-2008-2008-true/default_en.htm

Stewarding the Earth's Resources

Stewarding the Earth's Resources is an occasional bulletin for the church which:

- sets out current issues in waste planning
- is compiled by the Revd Jon Hale BA, who is an ordained Church of England clergyman with a background in waste management and planning.
- affirms the work of Waste Planning Authorities, Waste Collection Authorities and Waste Disposal Authorities and the work of the waste management industry.
- is published on www.earthresources.org.uk

In the Autumn of 2007 Jon Hale successfully completed research during a ten-week sabbatical on **Opportunities for the church to promote sustainable waste management in England**. His research report is on www.earthresources.org.uk

Since April 2008 Jon Hale has worked with the Revd Dr Andrew Craig to produce the quarterly publication **Christian Stewardship Sustainable Development**. This is also published on www.earthresources.org.uk The aim is to help the church make connections, so that the church may make a prophetic contribution to the promotion of Sustainable Development.

Previous editions of Stewarding the Earth's Resources:

1.	July 2005	What's happening to waste, and what can Christians conclude from this?
2.	October 2005	Sustainable Development: noble vision or national self-interest?
3.	November 2005	Incineration of municipal solid waste: a contentious issue
4.	January 2006	Rubbish tips dumped in £8bn waste revolution: UK faces 'rude shock' over cost of refuse disposal. (Reproduced from The Guardian 05.01.06)
5.	February 2006	Current issues in waste management from the standpoint of a skip hire / waste recycling company
6.	Easter 2006	Can London kick its waste export habit?
7.	Ascension Day 2006	Restoring the goodness of creation: waste as 'materials' and 'resources'
8.	June 2006	The Town & Country Planning system: delivering essential new waste facilities. (Interview with Hilary Herbert [president of the Planning Officers Society] reproduced from Planning 23.06.06).
9.	July 2006	Behavioural change and the social context of household waste management
10.	November 2006	The 'Waste Development Framework' and 'Sustainability Appraisal': the new basis for local council decisions on planning applications for waste facilities
11.	January 2007	The key role of local councils: • Meeting the waste targets • Deciding planning applications for waste facilities
12.	Easter 2007	A summary of a small selection of articles and features from 'Waste Planning' journal (no.62: March 2007) that show current issues in waste.
13.	June 2007	Waste Strategy for England 2007: the national waste strategy published in May 2007.
14.	January 2008	The need for new food waste processing capacity and difficulties in obtaining planning permission

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