PTE/11/3
Mid Devon Locality (County) Committee
20 June 2011

Waste Core Strategy and the Future Role of Waste Management in Energy Production

Report of the Head of Planning, Transportation and Environment

Please note that the following recommendation is subject to consideration and determination by the Committee before taking effect.

Recommendation: It is recommended that the Committee notes the content of this report.

1 Introduction

At the previous meeting of the Mid Devon Locality (County) Committee in March 2011 Members welcomed the principle of generating energy from waste in a local context and requested an additional report on this issue.

The generation of local energy from waste is a pertinent issue in the context of waste planning currently given the work which Devon County Council is undertaking in its role as Waste Planning Authority on the development of the Waste Core Strategy. Once adopted, the Waste Core Strategy will replace the current Waste Local Plan in providing the waste planning policy framework for Devon. In this regard, it will set out the overall strategy principles for waste planning in Devon, identify locations which may be suitable for waste facilities, and include policies to be used in the determination of waste related planning applications. The Strategy will cover the period up to 2031.

The principles of waste management and energy generation at a local level also relate strongly to the Big Society agenda which is currently being promoted by Government through the Localism Bill.

2. The Emerging Waste Core Strategy

Devon County Council is in the early stages of preparing the Waste Core Strategy. Currently, the Issues and Options consultation is ongoing (and finishes on 21 July 2011) and represents the first formal consultation stage in developing the Strategy. The Issues and Options Consultation Report identifies the strategic waste planning issues which the Waste Core Strategy should consider, together with the options for addressing them. These issues and options will be developed further into a preferred strategy direction following the completion of the consultation and further assessments.

One of the key principles which the Waste Core Strategy will need to consider is the overarching strategy for guiding waste facilities to appropriate locations. The Issues and Options Consultation Report contains three spatial approaches for addressing future waste management requirements. These are based on centralised, local and mixed approaches. The centralised approach would include a small number of larger-scale facilities, the localised approach would include a larger number of smaller-scale facilities, and the mixed approach could include facilities of a variety of scales across Devon.

The centralised, localised and mixed approaches include areas of search for future facilities in Mid Devon. This means that, potentially, locations for future facilities of various scales could be identified in Mid Devon following the completion of additional assessments.

Depending on the scale and facility technology, this may allow the local generation of energy from waste in the District. It should be noted that the current thinking is that the Waste Core Strategy should not prescribe which technologies are appropriate for different sites as the technologies available may evolve and improve over the course of the plan period and the Strategy needs to be flexible enough to allow new, more innovative technologies to come forward.

3. Local Generation of Energy from Waste

Generating energy from waste is one of a variety of methods which can be employed to produce local energy. Other renewable energy technologies include solar generation using photovoltaic cells, wind technologies and hydroelectric processes.

Energy from waste itself is a broad waste recovery concept which can be broken down into a number of waste technologies to generate heat and power. These technologies include anaerobic digestion, gasification, pyrolysis, incineration and plasma treatment amongst others. The energy generated during these processes can be classified as 'renewable' depending on the nature of the technologies, the efficiency of the process, the type of waste processed and the identification of markets for the electricity and heat. Further information on these different technologies is provided in the following paragraphs.

Anaerobic Digestion (AD)

Anaerobic Digestion is a process during which biodegradable waste is broken-down by bacteria in the absence of oxygen. AD can be used to treat most biodegradable wastes including food waste, green waste, agricultural waste and sewage. However, the process works most efficiently when the waste being treated is relatively uniform. AD treats waste to produce a biogas composed mainly of methane and carbon dioxide, which can be burnt to generate electricity, and a liquid digestate which can be used as a fertiliser. In terms of size, AD plants can be flexible, processing between 20,000 and 150,000 tonnes per annum. Because facilities can be small, AD plants can be used as a community solution to waste management needs, particularly if there are local markets for the resulting energy and digestate.

Incineration

Incineration generates energy from waste as it combusts. Although different waste components vary in terms of their suitability for incineration, most household, commercial and industrial waste is suitable. Refuse Derived Fuels can also be added to amend the mix of material being treated to improve the energy yield of the process. Small amounts of bottom ash remain at the end of the process. This can be recycled and used as an aggregate. Fly-ash is a hazardous by-product which has to be disposed of carefully. Gaseous emissions are treated carefully within the process before being released into the atmosphere. This part of the process has evolved significantly recently to ensure that emissions remain at safe levels. Safe emission levels are determined by the Environmental Permitting Regulations. Mass burn incineration plants can vary in size. However, smaller facilities may be less likely to be economically viable. At present, facilities with around 60,000 tonnes yearly capacity are deemed to be suitable, however the cost of treating the waste often reduces with larger facilities which can accommodate anything up to 1 million tonnes per year. Incineration plants require different sites according to their size. However, they are usually located in industrial areas with good access and a local market for the energy and heat which is generated.

Gasification

Gasification is an advanced thermal treatment used to process organic waste, or other waste containing hydrocarbons. Gasification differs from incineration because the waste is heated but not combusted. Treating the waste at high temperatures results in the generation of a gas which can be burnt to generate energy. Like many waste management technologies, gasification is an industrial process. Facility capacities can vary from around 20,000 tonnes to approximately 225,000 tonnes capacity per annum. Depending on the size of the facility, gasification plants are often located in industrial areas with good road access and local markets for the energy.

Pyrolysis

Pyrolysis is also an advanced thermal treatment process. However, it differs from gasification because it takes place in either the absence of oxygen or with oxygen levels strictly controlled. Pyrolysis can be used to treat organic waste or other waste containing hydrocarbons. Like in gasification, the gas which is processed can be combusted to produce energy. In terms of its operation, pyrolysis is fairly flexible in terms of plant size. Facility capacities can vary from between 20,000 tonnes to 225,000 tonnes capacity per annum. Depending on the size of the facility, pyrolysis plants are often located on industrial areas with good road access and local markets for the energy.

Plasma technology

Plasma technology can be combined with other waste management methods such as those used to separate recyclable materials or to treat waste thermally (e.g. gasification) or it can be used as a stand alone technology to treat residual waste. Waste containing various materials can be put through a plasma facility which breaks it down using high temperatures and electrical energy. The major benefits of plasma technology are that the main outputs can be used productively and only a small amount of residue requires landfilling. The technology is currently in use in the UK on a small scale. Facilities can be co-located with other waste management facilities such as Material Reclamation Facilities and gasifiers, often in industrial areas.

Wave resonance technology

Wave resonance technology is a new waste management process to Britain. It can be used to treat dry and wet wastes of various types, including tyres, plastics, oils, agricultural waste and sewage sludge by altering the frequency at which molecules in the waste vibrate. This alters the composition of the material. Depending on the technology used, wave resonance technology can be used to produce a refuse derived fuel in a liquid form which can be used in combustion engines and generators. There are currently no existing waste management facilities with wave resonance technologies in Britain, therefore the technology is locally unproven and the site requirements uncertain. However elsewhere, such as in Spain and Japan, units have modular capacities of between 10,000 and 100,000 tonnes per year. As a result of having a clean process without combustion, these facilities would be suitably located in light industrial areas, potentially helping to serve community as well as commercial needs.

Although energy from waste technologies vary, there are some similarities in their requirements. These include the need for consistent feedstocks (the waste material inputted to the system), the need for sites within close proximity to local electricity and heat users, a market for secondary outputs (such as digestate associated with anaerobic digestion) and infrastructure requirements.

Infrastructure requirements for energy from waste facilities can include transport provisions, grid connections and district heating networks. Providing for these various infrastructure needs can be facilitated by planning for the provision of waste facilities within wider developments (particularly employment land) which may also help to fund and deliver the infrastructure. Funding, however, often remains a significant issue, particularly for providing district heating infrastructure.

4. Other Local Energy Generation Technologies

A study has been undertaken by the University of Exeter to consider the potential for renewable energy generation across Devon. It draws together various other studies to determine the potential role which different technologies could play in meeting renewable energy targets for Devon.

The study is available at www.devon.gov.uk/env-directorate-climchngestratreview

A number of technologies were considered for use on a wider scale in Devon. The total potential renewable energy resource was calculated. The figures in the original report have been interpreted and included in Table 1.

Resource	Total potential energy resource (MW)	2010 target[1] MW
Small hydro	75	5
Photovoltaics	419	0.4
Energy crops	37	26
Anaerobic digestion	11	3
Poultry litter	1	4
Landfill Gas	n/a	9
Treated wood	5	15
Onshore wind	559 – 1,993	89
Total	**1,107-2,541**	**151**

Table 1: Potential renewable energy resource in Devon

This study underlines that there is considerable potential for additional renewable energy generation in Devon, particularly from wind and solar sources.

5. Further Work

The study did not specifically consider the potential role of waste management technologies for generating renewable energy in Devon, or where these processes may be most appropriately implemented. Further work is now required to consider this in more detail to help inform the preparation of the Waste Core Strategy and the preparation of the Preferred Strategy direction. This will also help to consider waste in the context of energy generation, potentially underlining the role which waste management could fulfil in areas where there are challenges for other renewable energy processes. This work will therefore also be used to inform a review of the Devon County Council Climate Change Strategy.

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Electoral Division: All in Mid Devon

[1] Derived from South West RSS target.

Local Government Act 1972: List of Background Papers

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Background Paper	Date	File Ref
None		

gm250511mdc
sc/cr/wcs future role energy production
04 hq 100611