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# Energy from waste: an introduction

**There is something appealing about energy generated from the power of the wind, the heat and light of the sun, the flow of a river, the movement of the waves or timber from a forest.**

By contrast, energy generated from the contents of our wheelie bins, from farmyard slurry or from sewage sludge is, well, not so attractive. Renewable energy is supposed to be clean, after all.

But just because energy from waste is the unglamorous member of the renewable-energy family, that's no reason to ignore its potential. An 'energy from waste' project may be ideal for certain communities.

Energy can be generated from different types of waste in a number of ways, but not all of these can really be considered 'renewable' forms of energy, and few will be suitable for a community project.

One way is the large-scale incineration of municipal rubbish – the stuff collected by, or on behalf of a local authority. This is what most people think of when they hear the term 'energy from waste'. Incineration can be a process that brings environmental benefits, but only if two conditions are met. The first is that as much recyclable material as possible has been removed from the waste before it is incinerated. This includes metals, glass, organic material and some of the plastic. The second is that the heat produced by the incineration process is either used to generate electricity or otherwise usefully exploited – in a district heating system for example. To fail to make use of the heat is simply a waste.

## Smart burning

An increasing number of modern waste disposal plants are now going beyond 'mass-burn' incineration. They're adopting a more sophisticated and efficient combustion process which involves burning the material in a controlled, oxygen-starved, environment. The process is not unlike traditional charcoal burning, and makes better use of the waste as a fuel for generating heat or electricity.

But is it 'renewable' energy? It's difficult to think of the burning of our discarded plastic bags, chip-wrappers, polystyrene coffee cups and nappies as 'renewable' in the same way as the wind or sunlight, so the answer is probably not. It's also not 'low-carbon', as even the most efficient incinerators produce CO<sub>2</sub>.

Perhaps the only forms of energy from waste that are renewable, are those based on biodegradable material – plant or animal material of various types – such as anaerobic digestion. The government certainly agrees, as energy produced from organic waste qualifies for payments under the same support schemes as wind and solar for example.

## Anaerobic digestion

Anaerobic digestion is the process by which plant or animal matter breaks down – or rots – producing a gas with a high methane content. The rotting takes place in a closed vessel and in a controlled atmosphere. The methane given off is captured and burned to produce heat, electricity or a combination of the two. After a while, the rotting process is more or less complete and you are left with a safe, 'clean', organic material that can be used as fertiliser or soil conditioner. Anaerobic digestion technology is well-established and is widely used by sewage treatment works to generate electricity. One such plant in Staffordshire, for example, produces enough electricity for themselves with plenty left over to sell to the national grid.

Another example of a working anaerobic digestion plant is at Holsworthy in Devon. This takes hundreds of tonnes of biodegradable waste a week from food processors, abattoirs, supermarkets and biodiesel manufacturers – as well as food waste collected by local authorities. The gas captured during the digestion is used to generate electricity. As long as the supply of waste is relatively stable, the Holsworthy biogas plant can produce enough power for around 8,000 homes.

But is this a model for a community project? Probably not, given the logistical, legal and financial complexity of the operation.

But there are some communities in rural areas for whom anaerobic digestion – albeit on a smaller scale – might be ideal. This is particularly the case for groups of dairy or pig farmers who have slurry, or liquid manure, to dispose of. They could club together – joined perhaps by other local businesses with organic waste to dispose of, like bakeries or cheese processors – and together could build an anaerobic digestion plant at a suitable site.

All members of the group could deliver their slurry to the site, thereby reducing their mounting costs of storage and disposal. At the same time the plant would generate electricity (and possibly heat), providing income for the group. And, as an additional bonus, the material left-over after the anaerobic digestion process could be spread on the land as a soil improver, allowing the farmers to cut down on the purchase of expensive and carbon-intensive artificial fertilisers.

### **What about cost?**

Anaerobic digestion systems don't come cheap – typically a million pounds and over. But they do have the potential to generate income and make cost savings. Recent increases in government funding for electricity produced from anaerobic digesters now makes it a prospect that rural communities shouldn't shy away from.



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