What is Waste to Energy?
Waste to Energy (WtE) - in the form of Anaerobic Digestion, or AD - is the process of generating energy from waste organic material (eg food waste, grass clippings). In this review we will focus on Anaerobic Digestion (AD) as opposed to plasma and other gasification technologies that effectively burn the waste.

AD, as the name suggests, uses bacteria to breakdown the material producing methane gas (along with other by products). Specifically the technology of AD we deploy is dry/plug flow and should not be confused with wet AD. Key aspects of dry AD is (as the name suggests) that very little – if any – water is added to the input waste. This dramatically reduces handling problems (both during the process and disposal at the end). Dry AD extracts significantly more gas, and the process overall is virtually odour free. A key part of AD is that it has to be done away from oxygen (the air) so is in a sealed environment. Apart from producing a large volume of methane (referred to as biomethane) the CO₂ released by the process can be captured for fizzy drinks, confectionary, industrial uses etc. The material left behind after gas extraction is sanitised (see below) and, with additional processing, can be used as a fertiliser or compost.

To make most processes work efficiently with waste food (which would go to landfill) it is mixed with green waste along with some energy crops (crops grown for energy production).

The biomethane can be used to power a generator making electricity or compressed to be fed directly into the gas grid network. With even further compression the gas can be stored in cylinders for use by transport, heating etc.

Compared to traditional ways of disposing of organic waste via landfill, WtE allows a valuable generation of energy through the use of biomethane, and capturing of carbon thus reducing greenhouse gas emissions.

Call +44 (0) 1600 891 557 or email info@ecodevgroup.com
Types of WtE in detail

As above, there are two main AD processes; wet AD and plug flow or dry AD.

Wet AD is where the input material (such as food waste or energy crop) is macerated into a slurry, or soup like material, using water and liquids that then acts as a carrier for the organic portion through the process. Up to 50% water and other liquids are added (tonne for tonne) so on a given input of waste the processing space needed is double the input volume. This is a batch flow process, so a mix is made (“soup”) then left to digest with pumps and stirrers, ensuring the digestion process works throughout the mix. Wet AD operates at temperatures around 36 deg C (referred to as a mesophilic process). After a batch process time of 25 to 45 days in a large vessel (size is likely to be double that of the input volume) about 60% to 70% of the methane available has been extracted. The end slurry, known as the digestate, is still gas active with energy remaining. This digestate is high odour and requires careful processing to allow it to be safely deployed, be this as fertiliser or such like. The challenge is exacerbated by the high amount of water and liquids used and still remaining in the digestate, this volume of carrier material then has to be safely processed or disposed of.

In plug flow (dry) AD the system does not need high amounts of water as a carrier. Depending on the water content of the input material (food waste, energy crop, green cuttings etc) a small amount of water (often just recycled from the process) is mixed in. This addition of a small volume of liquid is only to allow the material to be slowly moved through the process. The material goes into one end of a long chamber with the output at the other end arriving 20 days or so later (plug flow) as a continuous process. Mechanical arms churn the mix over this period to allow the material to release maximum gas extraction. The temperature used is 55°C (referred to as a thermophilic process) where the material is heated using a small part of the biomethane gas generated by earlier processing. In excess of 95% of the methane is extracted by dry AD. The small amount of water used in this process can be easily extracted from the output feed (and often redeployed into the input after some adjustment in chemistry eg alkalinity/acidity). The final output is a low odour sanitised and stable inert material that is simple to use as a fertilizer or by further processing as compost.

What are the advantages of plug flow AD?

- In excess of 95% gas harvest
- Runs at higher temperatures sanitising the outfeed material leaving this virtually odour free
- Can handle far greater range of input feed materials that would not be possible in a wet AD.
- Close to half the space needed compared to wet AD (because of needing far less water carrier)
- Continuous processing plug flow
- Low odour nature allows plant to be close to urban areas (so reducing transport costs to handle waste streams from large conurbations)
- Well proven - over 50 % (by volume) of AD run in Europe is dry AD and has been deployed there since the 1950s
How EcoDev work with a landowner

The offer is to enter into a 30 year lease of the land to develop an operating Waste to Energy (WtE) plant. The rental amount depends on the location and size system deployed. As a rough indication, rental rates are based on an 80,000 tonne per annum (TPA) site, realising a rental income of £80,000 per annum Consumer Price Index (CPI) linked. For every additional 10,000 TPA, this would achieve an extra £10,000 per annum. Technology deployed is from a number of well proven European suppliers. The site is operated in full compliance with all appropriate standards and the activity and land insured against all risks (no liability whatsoever to the landowner). EcoDev move a project along with a landowner through a series of phases as follows. Note we cover all landowner’s legal costs (subject to these being agreed) for all stages.

Phase 1
There are a few key issues surrounding a suitable location for a WtE facility. EcoDev undertake a preliminary study to determine initial feasibility:

- Appropriate land (ideally brown field up to 4 acres) with good road access and proximity to suitable waste material
- Suitable gas grid for export of biomethane (exporting electricity or compressing the gas to hold in cylinders can be options but are not as efficient)
- Review of planning authority stance on such technology

Assuming all is positive (and we share the results openly with the landowner) we move to the next stage.

Phase 2
- EcoDev and Landowner enter into an Exclusivity and Head of Terms with a limited (maximum 3 month) commitment. Note these Heads of Terms define the commercial offer we can make.
- At this time EcoDev engage with the Local Planning Authority and handle a formal Pre-Screening for the site and further secure the gas grid.
- If positive, EcoDev then enters into negotiation with Landowner’s legal advisors for Option to Lease Agreement (based on terms agreed within Head of Terms).
- Once Option to Lease Agreement is in place, EcoDev will proceed forward with submission of Planning.
- As soon as Planning has been discharged, EcoDev and Landowner to enter into a Lease Agreement.

Key aspects of lease
Break clause (funding requirement) 1 year in extremely unlikely as support mechanisms or similar are removed by government. Rental paid depending on plant processing size and waste stream availability. Amount payable quarterly RPI indexed

Conclusion
WtE is one way a landowner can realise significant value of their land over a 30 year period (we can also discuss buying the land) and also be part of reducing waste to landfill while making use of CH4 (methane) and also reducing CO₂ emissions, gasses that are linked to global warming.

If you would like to find out more about how we can maximise revenues from your land, please contact us. We promise not to pressure sell and you are in no way obligated – you have nothing to lose.

Frequently Asked Questions

What land is suitable?
We need a minimum of 2 acres to 4 acres depending on capacity of plant and gas grid volume. Ideally suited to brown field sites with good road and/or rail access. The land should not flood, be in an area of SSSI or AONB, ideally outside the Green Belt (this can be overcome in some cases and the plant can be located near to large conurbations. Close to waste supply catchment area, within a 15 to 30 miles radius. Ideally less than 0.5 mile from a main gas line.

How secure are my rental payments?
The sites will be co-owned by EcoDev and a Blue Chip institution. No one owning such a high value asset (≥£20M plus) will be seen as a credit risk. The revenues are underwritten by the Government through their RHI (Renewable Heat Incentive) schemes alongside the sale of biomethane to a reseller who will also be major corporations.

What happens at the end of my lease?
The WtE plant will be fully removed at the end of the lease or at the request of the land owner may be passed over as an operational entity.

What are the reasonable legal fees that you will cover?
We budget up to £5,000 for both Legal and Land agent fees.

How long will the process take to my first revenues?
While it is easy to offer over optimistic figures, we would rather be realistic. The process takes 10 to 12 months. This is made up of 8 weeks securing grid connection and completing pre-screening, alongside negotiating the Option and Lease Agreements. Planning takes a further 12 weeks. Discharge of all planning conditions takes circa 10 weeks to complete to commence construction at which point the Lease will be entered into.

What Security is required for the site?
There is CCTV on the entrance and perimeters with fencing or hedgerow on boundary. A night guard is usual due to the nature of the operation.

Call +44 (0) 1600 891 557 or email info@ecodevgroup.com

www.ecodevgroup.com