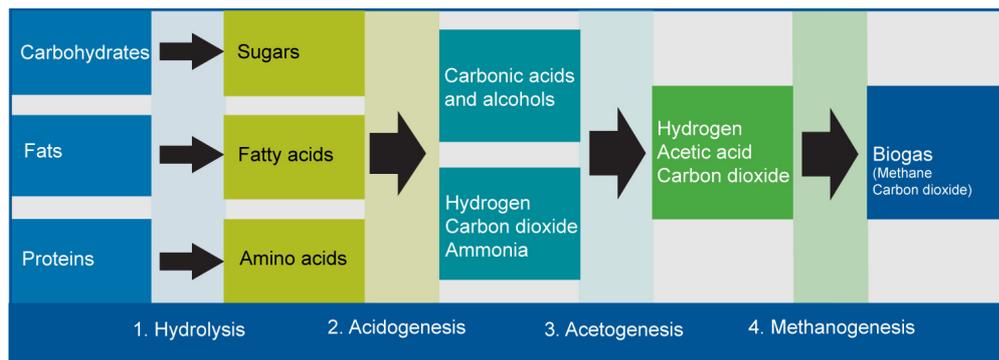


## Clearfleau Overview: Innovative Anaerobic Digestion for Food Processors

### Anaerobic digestion in the food sector

Anaerobic digestion (AD) allows micro-organisms that thrive in an oxygen-free environment to convert bio-degradable materials into biogas that can be used to generate renewable energy (heat and power). The digestion process involves a series of reactions as illustrated below.



Most food and drink processing residues can be treated with AD. Larger centralised “merchant” plants can be expensive to build and operate. Smaller AD plants installed on industrial sites may not generate large volumes of energy but they can provide valuable power and heat output (from a CHP engine or boiler) and contribute to site energy demand. These sectors provides an ideal platform for on-site AD, with a range of suitable feedstocks and the ability to use energy generated from unwanted residues.

### Benefits of on-site plants for food processors

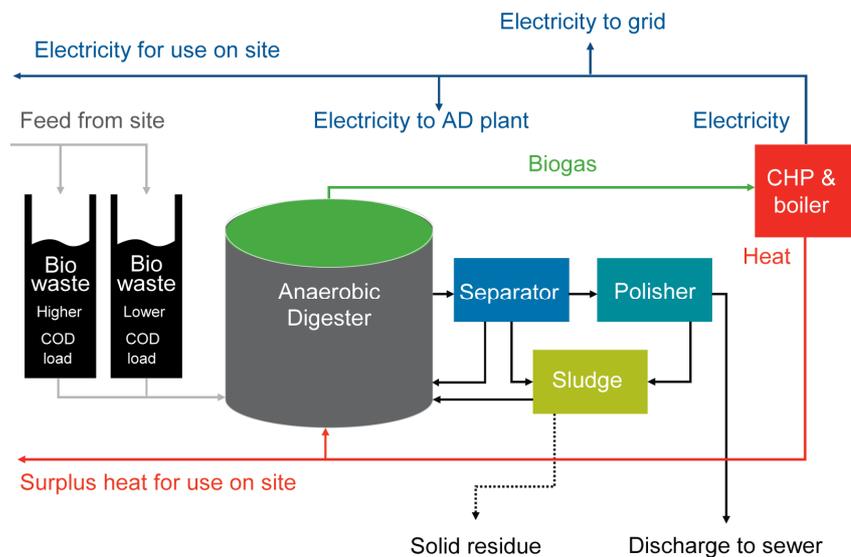
On-site AD will reduce disposal costs, while generating energy that can be fed back into the production process. Reducing the carbon footprint of production sites will help manufacturers present a sustainable image to customers. The cost savings that contribute to the payback for on-site AD projects include:

- Reduced co-product disposal charges - either by cutting costs of running aerobic plants on site or through a reduction in Mogden charges for sewer discharge.
- Reduced costs of sending residual materials off site for aerobic treatment, or from the disposal of higher COD materials generated in the production process.
- Reduced energy costs, as purchased fossil fuels (i.e. electricity, fuel oils and natural gas) are replaced by renewable energy (biogas) generated on site.

Government renewable energy incentives include the electricity Feed in Tariff (FIT) and Renewable Heat Incentive (RHI - effective in October 2011). Payments are indexed linked. The FIT pays between 8.68p and 10.13p per kW generated from biogas. The RHI pays 7.64p per kW for biogas fed to the gas grid or direct heat use under 200kW, or 5.99p for up to 600kW and 2.24p for over 600kW. Once registered, sites retain payments for 20 years. Viable on-site AD projects should cover capital costs in less than 5 years.

## Clearfleau's Approach to On-site Digestion

Clearfleau's innovative AD process (see below) treats processing residues, including lower and higher strength liquids. Bio-degradable solids are retained in the digester for up to 50 days, to optimise biogas output but the liquid fraction is retained for less than 6 days, reducing the size and cost of the digester.



Compared to other high-rate liquid AD systems, Clearfleau's process advantages include:

- The ability to treat feedstocks containing fats or suspended solids
- Optimal methanogenic bacteria performance maximises biogas output.
- Up to a 98% reduction in COD load of material fed into the digester tank.
- Performance exceeds other AD systems, enhancing return on investment.
- Design that is tailored to on-site feedstocks but also fits on a confined site.

Clearfleau's plant at BV Dairy in Dorset has been operational for 4 years. The project, supported by WRAP under the ETF\* scheme for innovative anaerobic digestion, is designed for the liquid feedstocks generated on-site and pumped to the AD facility. The bio-degradable fats and sugars are converted into biogas that is fed to a CHP engine to generate renewable electricity and heat used on site. Sites that are using this system are reducing effluent treatment charges and energy costs and cutting CO<sup>2</sup> emissions. In addition, two new projects in the distillery and biofuel sectors will be fully operational by mid 2015.

Clearfleau continues to develop on-site digestion solutions for the food and beverage sector, handling a range of bio-degradable materials, including a modular unit for smaller sites and export projects. The first Clearfleau on-site gas to grid plant will be operational on a dairy processing site in early 2016. For more information visit [www.clearfleau.com](http://www.clearfleau.com) or call Richard Gueterbock (0844 477 6292).

\* The Environment Transformation Fund (ETF), managed by WRAP (Waste & Resources Action Programme), was funded by DECC (Department of Energy & Climate Change) and DEFRA (Department of Food & Rural Affairs).