



# Holsworthy Biogas Plant

## ANAEROBIC DIGESTION

### **The first large-scale centralised anaerobic digestion plant for cow slurry in the UK has now started operation in Holsworthy, Devon.**

The plant has been built by the German company Farmatic Biotech Energy ag. The company is also the main shareholder in Holsworthy Biogas Ltd., which was established in 1998. The remaining shares are to be held by the entrepreneur and local community and the supplying farmers after full payback. Farmatic are also assisting in the operation of the plant.

Holsworthy Biogas has the capacity to process 146,000 tonnes per annum of cattle, pig and poultry manure plus organic food waste (20%). The manure is collected from 30 local farms within a 5-6 miles radius of the plant. The food processing waste is collected direct from food processors in the Devon and Cornwall area of the South West.

The manure and food waste are first discharged into a reception pit in which a ventilation system operates in the receiving

hall. The air taken from the hall passes through a bio-filter in order to reduce any risk of odour.

The manure and waste are thoroughly mixed before being discharged into a larger mixing tank. The mixture is then pasteurised by heating to 70°C through a three-stage heat exchanger. The pasteurisation process takes one hour and kills all weed seeds, pathogens and viruses (including Foot and Mouth disease, TB and the like). The processed material that eventually leaves the plant is therefore of higher value for farmers to spread on their fields, and the risk of disease spread has been removed.

After pasteurisation the mixture is pumped through the heat exchanger into either of the two 4000m<sup>3</sup> digesters located at the plant. Anaerobic digestion takes place at 37°C with an average retention time of 20 days in either tank. The biogas released by the digestion process is methane gas. It is initially cleaned in a de-sulphurisation unit and then stored in a gas store above the final digestate in the storage tank.

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Storage tanks at the Holsworthy Biogas plant.

The digestate (the treated waste mixture) is eventually returned to the supplying farmers as a valuable bio-fertiliser.

The plant operates its own lorries, transporting the bio-fertiliser to the supplying farms and then returning with raw animal manure. The lorries are specially designed for these operations.

Holsworthy Biogas Ltd has benefited from a £3.85 million EU grant from the Objective 5(b) programme administered by MAFF (now DEFRA) and their local District Council of Torridge. The total project cost will be £7.7million.

Extra storage facilities to hold the bio-fertiliser are provided on the farms by Holsworthy Biogas. This has been possible because of the EU grant. The bio-fertiliser has a higher

nutrient value than the original animal manure, which means that farmers can reduce the use of artificial mineral fertiliser. The extra storage capacity provided on farms means that farmers only have to spread the fertiliser during the growing season. This helps minimise any risk of pollution.

The total gas production is budgeted to 3.9 million m<sup>3</sup> methane per year (this equates to 39 million kWh of energy per year). The methane produced by the plant will be used by two gas engines to generate electricity and heat. They have a combined total power capacity of 2.1 MWe with a budgeted gross power production of 14.4 million kWh per year.

The electricity produced will be sold at 5.93p per kWh (2003 price level) under a 15 year

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Non-Fossil Fuel Obligation (NFFO) contract granted to Holsworthy Biogas. The price is indexed linked and will increase or decrease over time according to the Retail Price Index.

The project is creating a number of local jobs in the Holsworthy area. Furthermore, the project could help keep some farmers in the farming business due to the benefits of joining the project.

It is anticipated that all the excess heat produced by the plant will eventually be sold through a new district heating system to supply the market town of Holsworthy. The amount of heat available to supply the district heating main will be about 15 million kW<sub>th</sub> per year. Initially, it is planned that the hot water will be used to heat the town's new hospital, schools and other public buildings.

This will further benefit the whole town because the district heating will provide a substitute for oil and other fossil fuels thus reducing air emissions within the town.

The anaerobic digestion of manure and waste not only has a positive influence on the environment, but also offers many direct advantages to the farming sector :

- Reduction in the risk of spreading disease.
- Reduction in emissions to air, including significant greenhouse gases.
- Reduction in odour problems.
- Reduction in the use of artificial mineral fertilisers.
- Reduction in the need for landfill through the increased recycling of waste.
- Reduction in surface and ground water pollution.



The gas engines at the Holsworthy Biogas plant.

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The net sale of electricity at 13.5 million kWh/year will substitute the same amount of conventionally produced electricity resulting in reduced CO<sub>2</sub> emissions of 8,960 tonnes/year based on the current fossil fuel mix at power plants. Furthermore, there is a considerable reduction in methane emissions, which is 23 times (IPPC, 2001) more harmful as a greenhouse gas than CO<sub>2</sub>. If all the extracted methane was released uncontrolled to the atmosphere this would have the equivalent effect of up to 206,080 tonnes of CO<sub>2</sub>. Finally, the district heating will give a CO<sub>2</sub> reduction as well. The actual reduction depends on the substituted fuel.

The combined pre-pasteurisation and anaerobic digestion of the waste is a very environmentally responsible form of treatment for these wastes, which at the same time also gives higher nutrient values to the farmers. Furthermore, this process is in line with the new 'EU Animal By-Products Regulations (Category 3 material)'.

The project in Holsworthy, which is based on many years of experience gained from the successful operation of similar plants in Germany and Denmark, is expected to be the first of several centralised anaerobic digestion plants in the UK. Farmatic estimate the UK potential as 100 plants.

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