

HAFFMANS BIOGAS UPGRADING

WIGHT FARM ENERGY LLP

CASE STUDY



KEY FACTS

Product

Advanced *Plus* system

Technology

Membrane/Cryogenic

PLANT CAPACITY

Biogas

1050 Nm³/h

Biomethane

580 Nm³/h

CO₂

6,900 tons per year

Methane Usage

Injection into gas grid according to UK specifications (GSMR)

CO₂ Usage

yes

Biogas Source

Energy crops

Benefits

- Full process control without methane slip
- CO₂ as a profitable product

FARMERS ON THE ISLE OF WIGHT ARE NOW ENERGY PRODUCERS

At a time when the prices for arable crops have collapsed, shipping crops overseas at additional cost in order to be processed becomes unviable and change is required. Farmers on the Isle of Wight decided to use their crops to provide biomass to generate gas for delivery to the grid. Pentair Haffmans delivered the biogas upgrading technology and the manpower to meet an important deadline.

The new anaerobic digester plant was built near the village of Arreton, in the middle of the Isle of Wight off the south coast of England. Some of the Islands farm holdings wanted to secure a guaranteed income from their rotation crops at this time of low prices for conventional crop production. Within six months, they turned a liability into an asset by growing maize and grass silage and turning it into biomethane for injection directly into the National Grid.

Alternative markets

Mr. Thomas Smith is one of six farmers who, in partnership with Isle of Wight Grain, founded Wight Farm Energy LLP to become an energy producer. 'Shipping our crops all the way to the mainland with associated costs simply does not make sense. We were looking for alternative markets for these bulk products.'

Once the decision for anaerobic digestion (AD) was taken, the Arreton site was selected because of its central location, connections to the agricultural irrigation system, the electricity and the gas grids. The new AD plant will produce biomethane from an annual 55,000 tons of break crops from 53 farms and approximately 1500 hectares of land. Break crops are used to alternate between the main arable crops (such as wheat, barley and oilseed rape) in order to keep the soil healthy. Maize and grass silage, demand for which has reduced due to the declining livestock sector, are now being digested to produce biomethane, organic fertilizer and liquefied food-grade CO₂.

Renewable Heat Incentive

As a financial incentive to increase the uptake of renewable energy, the UK government provides a subsidy, payable for 20 years, to renewable heat generators and producers of biomethane for injection. With a ten percent cut in the tariffs of the Renewable Heat Incentive (RHI) coming up at the start of 2015, Wight Farm Energy had a major deadline to meet when they approached Pentair Haffmans in August 2014.



'In order to inject gas into the grid, it has to meet certain specifications', explains Pentair Haffmans sales manager Mr. Francois Huberts. 'Biogas consists of roughly 55 percent methane and 45 percent carbon dioxide. It turned out that the supplier of the digester could not deliver a system that included CO₂ recovery. In fact, some of the methane would also be lost with their Pressure Swing Adsorption or PSA process.'

With the introduction of Sustainability Criteria by the government, the carbon footprint had to be reduced. Every aspect of the process of gas production had to be analyzed and Pentair Haffmans has provided a system providing maximum efficiencies, minimum CO₂ cost and zero methane loss.

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No Methane Slip

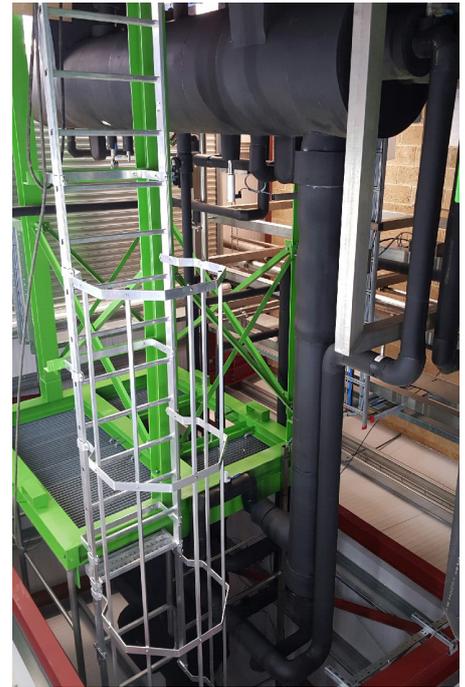
In September 2014, the first Haffmans engineers travelled to the Isle of Wight to start work on a biogas upgrading facility with an integrated CO₂ liquefaction system, and without any 'methane slip'. Tom Smith: 'From the start, we had every confidence in the staff and the cooperation. They are excellent engineers who work very thoroughly and were far more involved than I had expected. Roy Barclay from Future Energy Services was the technical integrator and coordinator. He studied several options for us to produce renewable energy, and also brought Pentair Haffmans in when it became clear we had to go the extra mile in this project.'



In just sixteen weeks time, they succeeded in building and commissioning the biogas upgrading system. On Christmas Eve, when everyone was going home, the first gas was fed into the grid.'

CO₂ Off-take

The AD plant at Arreton is now producing biogas at a rate of 1,050 cubic meters an hour, and the upgrading facility turns it into 580 cubic meters of biomethane and 810 kg of liquefied CO₂. 'The original idea was to deliver the CO₂ to a nearby greenhouse complex by pipeline', says Mr. Smith. 'When that deal started to look uncertain, we had to look for alternatives for the CO₂ off-take. Having a steady customer for the food-grade CO₂ is a vital part of the economics of this project, and we now have a major industrial gases company that is interested in local CO₂ production because of the transport costs. We feel this AD plant is benefiting the whole island, the environment and the rural economy, by providing income with a sustainable process.'



HAFFMANS BV

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