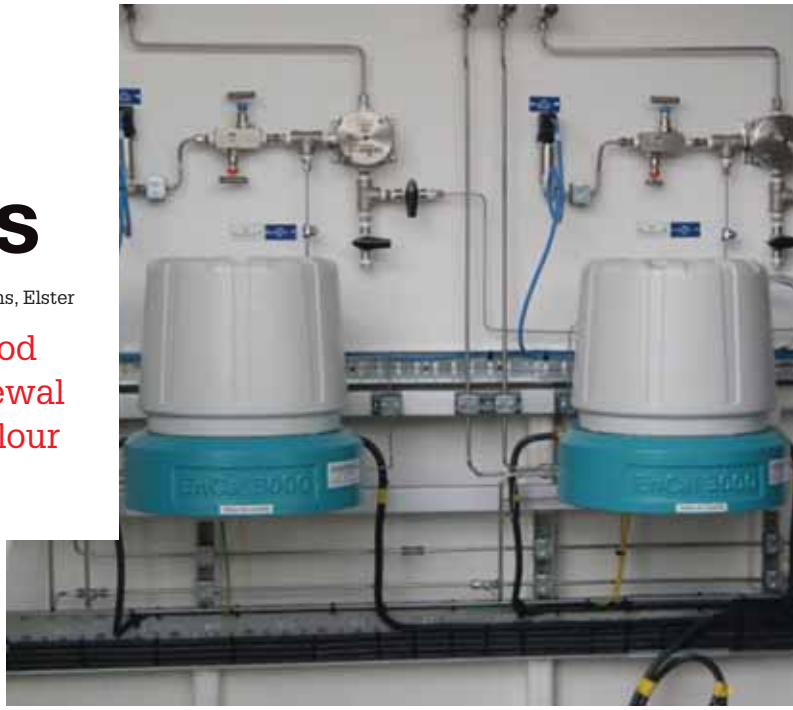
From waste to gas – while feeding tomatoes



By Andrew Lings, Key Account Manager for Fiscal Metering and Biogas Stations, Elster

Few will argue that green and red are a good match. While green stands for nature, renewal or regeneration, red is often seen as the colour of passion and love, but also of endurance and courage.

For one farmer in Worcestershire, all of this may seem like psychological twaddle, but his tomato greenhouse combined with a biogas plant was certainly an innovative application of a renewable energy concept and, without a doubt, it required courage and endurance to make it all happen. Being one of the first commercial biomethane installations in the UK, it was anything but a straightforward operation.

CO_2 – a plant nutrient

Matt Powell from Vale Green Energy, in Pershore, Worcs., is running a first-of-its-kind tomato greenhouse in combination with a biomethane production facility. Traditionally, greenhouses are heated with CHPs running on natural gas. The CO_2 released during the burning of natural gas is used to fertilize the greenhouse. In fact, the much maligned gas CO_2 is an essential plant nutrient. Increasing its concentration in the air is a frequently used method to make crops in greenhouses grow faster – a strange contradiction to our general view of CO_2 as the alleged cause of global warming.

Matt uses the waste from his tomato crop together with other waste sources from other farmers to produce biogas. Instead of producing electricity from raw biogas, the gas is upgraded to biomethane by removing CO_2 and other unwanted components. The innovation in the whole concept is that the CO_2 is not simply vented into the open but is used to fertilize his greenhouse.

The produced biomethane is either used for generating the heat required for the greenhouse or is injected into the natural gas grid of the local distribution network, which is operated by Wales and West Utilities. The concept is drawing a lot of national and international attention because it is a showcase of innovative thinking.

On a national level, it is the first commercially-operated biomethane grid injection system in the UK and Elster is proud to have been selected as the supplier. The expertise Elster has gained in other markets like Germany and France means that Vale Green Energy felt comfortable with the technical solution offered.

Gas to grid in the UK

Compared to the situation in France and Germany, the UK has its own approach when it comes to connecting biomethane suppliers to the grid.

In Germany, the grid operator is the owner of the grid injection system and the supplier of the gas contributes to the investment costs of the system. This contribution is a one-off investment which is capped to a maximum of €250,000. Since most grid injection systems in

Germany are connected to medium or high pressure gas grids, compressors are required which are often built redundant in order to guarantee a high up-time of the system. For this reason, the total investment costs for a system are currently the highest in the EU.

In France, the grid injection systems are much more compact and often do not require compressors or propane blending. Propane blending is used when the calorific value (CV) of the gas produced does not correspond to the CV of the gas in the grid. In many cases in France, this is not required since the CV of the gas in the grid is close to that of the biomethane. The systems are purchased by the network operators and the biomethane supplier rents the system from them.

In the UK, there is a unique situation in which there are two possibilities:

Maximum connection: the biomethane producer pays the network operator a certain fee or rental cost to take care of the whole grid injection system. The network operator owns and operates the system.

Minimum connection: the grid injection system is owned and purchased by the biomethane supplier. It has to comply with the rules set by the network operators. The network operator will be sent all relevant measured data and can close an entry valve to the grid if the gas supplied does not comply with the specifications.

This remotely operable valve (ROV) is the only part owned by the grid operator.

In Pershore, the connection to the Wales and West network was arranged according to the so-called "minimum connection" scheme. Elster supplied the grid injection station to Vale Green Energy Ltd. and the ROV was handled by Wales and West Utilities themselves.

The station supplied comprises the following system parts:

- Propane blending system
- Pressure reduction system
- Flow measurement
- Ofgem approved gas quality measurement
- Flow-weighted average calorific value (FWACV) calculation
- Diverter valves to divert "off-spec" gas
- Odorization system

"One of the key products in the biogas injection station is always the gas quality analyser."

Ofgem and FWACV

One of the key products in the biogas injection station is always the gas quality analyzer. With the EnCal 3000 gas chromatograph (GC), Elster can offer a state-of-the-art product. However, the UK market has its special requirements when it comes to gas quality measurement. First of all, there is the local metrological approval the GC has to obtain from Ofgem. In early 2013, Elster was the first company for many years to be granted this approval. The second main requirement is the ability to provide a flow-weighted average CV value. This requirement is UK-specific and applies to all "regulated" metering systems.

With the Springhill system, the UK sees its first GC on the market complying with the Ofgem specification and offering a proprietary solution to the flow-weighted average CV requirement. With this innovation, Elster is supporting the deployment of renewable energy in the UK by offering a cost-effective solution that is fully compliant with all regulations. As Albert Einstein once said: "Things should be made as simple as possible, but not simpler". ■

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