Introduction
Following years of heavy reliance on fossil fuels and nuclear energy, societal pressures have led the UK Government to increasingly support the production and use of renewable energy. One of these alternative fuel sources is biogas, which is generated from the process of anaerobic digestion.

Utility companies and sewage treatment works use anaerobic digestion as part of the process to treat biodegradable waste and sewage sludge, also known as biomass. This produces biogas, a mixture of methane, carbon dioxide and traces of other contaminant gases.

The methane, hydrogen and carbon monoxide can be combusted to produce energy, either through burning in boilers or recycling through a combined heat and power system. Often the electricity and waste heat generated from these processes are used to warm the digesters or to heat buildings, with excess being sold to suppliers or fed back into the local grid.

The application
A major UK sewage treatment works wanted to upgrade its four digesters by monitoring the amount of biogas being produced from sewage sludge. Biogas was initially being used to feed several boilers, with the long-term aim of introducing combined heat and power to the site. Accurate measurement of biogas production would allow the site to calculate the efficiency of the anaerobic digestion process.

Ascertaining optimum efficiency is important for the site as overloading with excessive biomass may inactivate the biomass, requiring a cost-intensive restart. Adding too little biomass also has financial consequences, as less electricity and heat are generated and revenue is therefore lost.
The problem
The sewage treatment works produced a fluctuating volume of gas with differing pressures, depending on the time of year and the variations in the volume of sludge entering the process. The company needed accurate flow measurement of the biogas that would not be affected by low pressures, moisture and particulate content or fluctuations in flowrates.

The solution
ABB supplied the sewage treatment works with thermal mass meters to measure biogas production.

Thermal mass meters deliver an accuracy of around one percent with a turndown ratio of around 150:1. This means they are far more accurate than most flow measurement techniques for the very low flows often found in pre-booster biogas applications.

Thermal mass meters also provide a direct measurement of the mass flow so their use is much more straightforward and cost effective than techniques that derive the mass flow information indirectly, using additional instrumentation and flow calculation equipment or software.

In addition, because thermal mass flowmeters take measurements using two small probes on the end of an insert they form only a minor obstruction in the surrounding flow. This means that correctly sized thermal mass flowmeters offer an extremely small pressure drop of between one and two millibars, which is important in this application where the gas pressure can drop to very low levels.

As well as the supply of equipment, extra peace of mind was delivered by ABB’s service support. For example, when a malfunctioning gas recirculation pump damaged a meter by coating it with oil, ABB’s service team rectified the problem within two days.
What ABB can offer

**Sensyflow thermal mass flowmeter**

ABB’s Sensyflow thermal mass flowmeters are suitable for all industrial and test rig applications that demand quick and precise gas measurement. Sensyflow flowmeters directly indicate the mass flow or normalized volume flow of gases without any additional pressure and temperature compensation. The flowmeters provide high accuracy, short response times and a very wide flow range with virtually no loss of accuracy even at the lowest flow rates.

Thermal mass flowmeters provide a mass flow output without pressure or temperature compensation, making ABB an excellent choice in gas flow instrumentation:
- Modular design optimizes accuracy and reduces installation, commissioning, and maintenance costs
- Up to four characteristic gas flow curves with only one single meter
- Best in class response time and accuracy
- Special units for process gas measurements in boiler control, biogas measurements, compressed air accounting, pharmaceuticals, pneumatics and food and beverage applications.

**Service**

As a leading manufacturer of instrumentation for more than 100 years ABB understands what customers are looking for from an asset – high performance throughout its lifecycle.

Building on this experience, ABB offers its customers an extensive range of knowledge-based solutions. ABB provides tailored solutions to meet specific industry applications, standards and customers’ unique needs.