

## **Technical article**

### **Gas Measuring Technology in Biogas Plants**

**The liberalized gas market is opening up new marketing opportunities for biogas plant operators by allowing free access to gas networks. The resulting requirements for quality assurance of the biogas can be met reliably and economically through special gas measuring technology.**

Biogas plants are often not, or not yet, perceived for what they really are – namely, an important factor in the effort to achieve a secure and increasingly renewable energy supply. The 8000 plants in Germany today represent an electrical capacity of almost 4000 MW, which corresponds to the capacity of several nuclear power plants. You can't tell by looking at these compact plants, which are often integrated in the landscape, that a technologically sophisticated and economically important process is running there day after day.

#### **Liberalized gas market provides opportunities**

The importance of biogas plants has further increased since the “Internal energy market in the European Union” was regulated by Directive 98/30/EC and later by Directive 2003/55/EC. These rules apply to the gas market, which is understood to include natural gas, liquefied natural gas (LNG), biogas, and gas from biomass. The Directive expressly provides for the right of free access to natural gas networks and LNG plants by third parties (“liberalization of the gas market”). Accordingly, the EU member states must ensure that suppliers of gas from biomass and other gas types, taking into account quality and safety requirements, can freely access existing natural gas networks for feed-in of their products.

Some German biogas plant operators have already taken this path. Others will follow in view of the now unhindered network access. All will be obligated to control their plants in such a way that the biogas, or biomethane end product derived from it, meets the specification of the respective system operator prior to feed-in. This calls for the use of measuring technology to determine the gas composition and other gas parameters at various points of the plant.

#### **Gas measuring technology assures process flow and gas quality**

Behind the often simple appearance of a biogas plant is a sophisticated process technology that produces high-quality combustion gases from manure, waste materials, and/or plant material. This multi-stage, time-consuming conversion process (fermentation with hydrolysis and methanation) runs largely automatically, given the right process conditions: temperature and pressure, raw material feed, gas composition, fraction of contaminants and inhibitors, and much more. “Everything has to be right” – that is the responsibility of the measuring technology, which keeps the whole process under control and signals automatically if anything gets out of control. This enables prompt counter measures to be taken and protects the operator from high financial losses, where applicable.

#### **Powerful and affordable**

Users have had and continue to have different views of the importance of measuring technology in biogas plants. Some take the use of modern measuring technology for granted (as is the case throughout the process industry) when it relates to safety, quality, and economic operation of a production process. Others view measuring technology as complicated and expensive and unnecessary in many cases. The truth is that correctly dimensioned and

operated measuring technology works reliably, assures the process and the product quality, prevents bad batches, and is, above all, affordable, as shown by the devices of UNION Instruments, for example.

This 90 year old German company has concentrated from the outset on development and production of measuring devices for the gas market with special emphasis on the mine gas market in the steel and glass industries and, for over 10 years, on the biogas market. The modular CWD (continuously measuring combustion calorimeters) and INCA (extremely flexible gas analyzers) device series have a robust design suitable for use in harsh environments and can be adapted to the particular application. Technological highlights include the continuous direct measurement of the Wobbe index, a patented measuring technology for analyzing the H<sub>2</sub>S concentration, and the miniaturization of gas detectors with calibration stored directly on the detector unit.

### **Everything from one source**

There is a need for reliable and cost-effective monitoring of the composition, energy content, and volume of biogas and biomethane at various points in a biogas plant, including at the fermenters, flare, gas purifier, and gas engine and where the biogas is processed into biomethane and fed into a gas system. That is familiar terrain for UNION Instruments. The highly reliable, moderately priced devices of the INCA and CWD series configured for the specific application have proven very effective here. With the two devices, UNION Instruments covers all gas analysis requirements of a modern biogas plant. Sample stream switchover enables one device to monitor multiple measuring points. The "everything from one source" concept also includes the supply of occasionally needed gas volume measuring technology and a recently introduced service offer that provides periodic services at attractive prices, thus further increasing the operational reliability of the plant.

### **Conclusion**

The liberalized gas market is providing new marketing opportunities for biogas plant operators. Linked to that is the increasing importance of suitable gas measuring technology. Powerful, easy to handle, and reasonably-priced devices are available for this.

***UNION Instruments at E-world 2015: Hall 2, Booth 2-427***

***UNION Instruments at Achema 2015: Hall 11, Booth E 27***

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### **About UNION Instruments**

*UNION Instruments GmbH, founded in 1919, is a specialized supplier of measuring instruments in the areas of calorimetry, gas composition and pressure registration. Its user and customer base includes biogas producers, the chemical industry, and energy and water suppliers. The company has its headquarters in Karlsruhe, Germany and a subsidiary in Lübeck, Germany. With 20 international distributors, UNION Instruments operates worldwide (e.g., USA, China, Russia, Brazil, Belgium). The company's core businesses include production and development as well as maintenance, service, and support.*

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**Figures / Captions (Figure 1: Fotolia; Figures 2a, 2b, 3: UNION Instruments)**



Figure 1: Typical biogas plant (Figure: Fotolia)



Figure 2a, 2b: CWD calorimeter (left) and INCA gas analyzer (right)

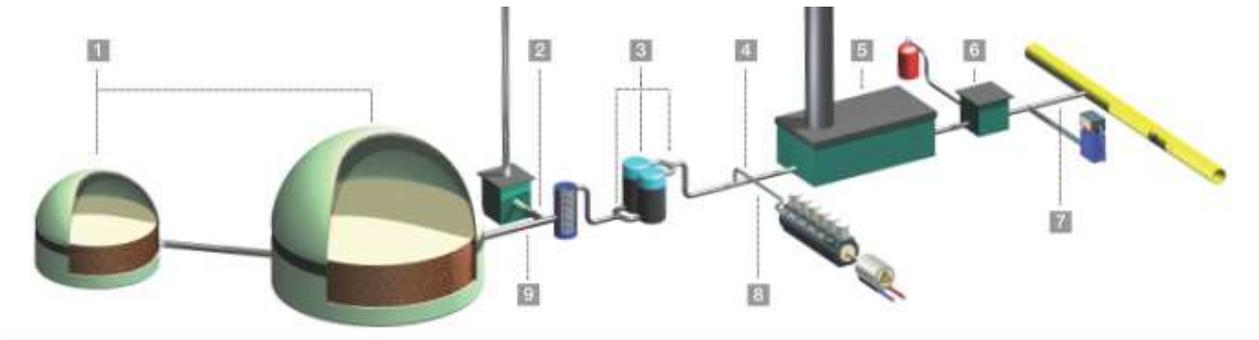


Figure 3: Gas analysis measuring points of a biogas plant (1: Fermentation (INCA), 2: Flare (INCA), 3: Gas purification (INCA), 4: Raw gas billing (CWD), 5: Processing (INCA), 6: Conditioning (INCA), 7: Biomethane feed-in (INCA, CWD), 8: Gas engine monitoring (INCA), 9: Raw biogas volume measurement (third party))



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