Turn on your Bio-Engine

Guide for measuring the key parameters in your biogas plant

eBook

VAISALA

Welcome!

This eGuide will give you practical information on how to improve your biogas process with accurate measurement and control. This will result in improved profitability and lower operating expenses. We hope you find the information useful and fruitful for your business.

Vaisala is a global leader in industrial and environmental measurement, committed to reliable environmental observations for better devcision-making, safety, and efficiency.

The biogas industry has unused potential

Anaerobic digestion has proven to be the most efficient technology for fermenting biodegradable solid waste. Adding valuable by-products such as biogas and fertilizers to the equation, it is no wonder that the amount of biogas plants is rapidly growing.

Biogas plants also have an important role in improving the nutrient cycle on the planet, as they help to keep nitrogen and phosphorus separate from Earth's water bodies. This, in turn, prevents eutrophication, which refers to water quality degradation and increased growth of algae.

Simply put, biogas production is a sensible technology. Yet, a lot of potential is still unused, and experts in the field are ambitiously developing bio-based industry processes. Possibilities exist to utilize new waste resources, increase the amount of side streams, and optimize the current biogas process.

Getting it right with the best available technology

How to optimize the process further? High-quality instrumentation that connects with the plant monitoring system and can be easily integrated with the process will help plant managers gain higher biogas quality and lower operating expenses.

To ensure proper functionality of the digester and to reduce air emissions, there are some overall measurement parameters[1)] to think about:

- pH level & alkalinity of the digester feed
- operating temperature of the digester hydraulic and organic loading rates of the feed
- ammonia and volatile fatty acid concentration (digestate & within the digester)
- levels of the digester liquid and foam
- biogas quality, composition, quantity, and pressure

Vaisala is your #1 partner for ensuring biogas quality and composition as well as for protecting your CHP (combined heat and power) engine from breakdowns caused by moisture. Read further to see how.

[1)] COMMISSION IMPLEMENTING DECISION (EU) 2018/1147 of 10 August 2018 establishing best available techniques (BAT) conclusions for waste treatment, under Directive 2010/75/EU of the European Parliament and of the Council.

Biogas production – challenges and opportunities

Understanding the significance of accurate data in a biogas plant is what defines success at the end. After implementing the basic digester monitoring setup, it is good to consider the following:

Why optical humidity measurement?

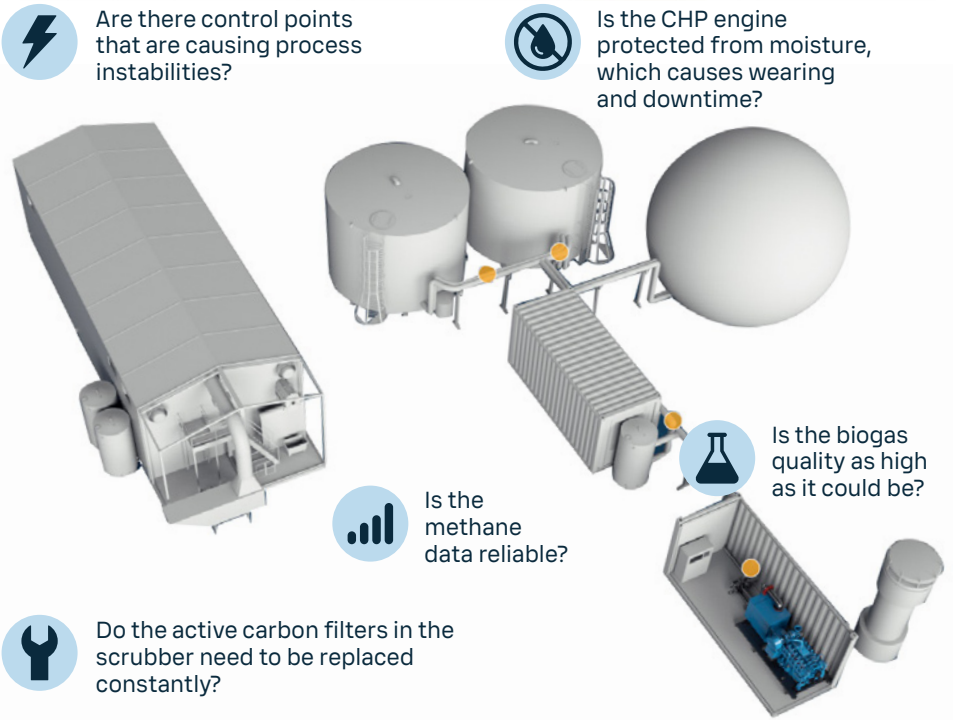
When humidity measurement is performed in a flammable gas mixture and in the presence of corrosive chemicals, optical humidity measurement in the infrared (IR) wavelength range has many attractive properties.

Read more online

Visit vaisala.com/biogas to watch to watch an animation of the benefits and register for online training.

Waste to value with Vaisala

Vaisala's 3-in-1 measurement probe, MGP261 is very easy to install and use. The key feature of Vaisala MGP261 is superior easiness. It is almost calibration-free, and there is no need for taking samples. MGP261 probe measures CH_4, CO_2 and H_2O. Auto-calibration reduces expensive calibration work significantly.



Key measurement points with Vaisala MGP261 Multigas Probe

Measurement glossary

Are measurement terms familiar to you? These are some of the key terms we keep in mind when optimizing our products to accelerate your process.

New to biogas?

What is biogas and anaerobic digestion, and how does the process work? What are the different types of biogas? Read more about biogas production and its benefits from our blog.

Glossary	
Measurement accuracy	Closeness of agreement between a measured quantity value and a true quantity value of a measurand.
Measurement precision	Closeness of agreement between indications or measured quantity values obtained by replicate measurements. Sometimes erroneously used to mean **measurement accuracy**.
Hysteresis	A variation in measurement induced by a direction change.
Non-linearity	A change in measurement sensitivity with regards to the magnitude of the measurand.
Calibration	The comparison of a measurement value against a reference or calibration standard.
Calibration uncertainty	The cumulative sum of measurement uncertainty for the calibration reference along the traceability path from the used calibration reference (working standard) up to the top-level reference (primary standard).
Adjustment	The adjustment of the transfer function against a calibration standard. Adjustment at more than two points along the dynamic range indicates poor linearity of the measurement device.
Metrological traceability	Property of a measurement result whereby the result can be related to a reference through a documented, unbroken chain of **calibrations**, each contributing to the measurement uncertainty.
Sensitivity	A relation between the indication of an instrument and the corresponding change in a value of a quantity being measured.
Selectivity	Independence of a measurement system for changes in other factors than the measurand (environmental variables, chemicals etc).
Resolution	The smallest change in measured quantity that causes perceptible change in measurement indication. In electronic instruments, the resolution may be affected by analog output stage resolution and scaling.
Stability	Property of a measuring instrument, whereby its metrological properties remain constant over time.