Real-time quality measurements in biogas and biomethane

Benefits at a glance
- High quality, repeatable and fast measurements
- Low maintenance
- Reliable in harsh environments
- Accurate and real-time measurements
- NIST traceable calibrations

Summary: Biogas is on its way to becoming a staple in the movement to reduce our carbon footprint on the planet. Biogas is a renewable source of energy that comes from a variety of sources. Once biogas is formed within the anaerobic digester, it is processed to remove unwanted contaminants such as H_2O, CO_2, and H_2S. In nature, biogas is formed when organic matter is broken down by bacteria through a natural biochemical process. With the utilization of anaerobic digesters, this natural process is now being replicated by large and small biogas producers.

Challenge: post processing – meeting gas quality requirements

After biogas is processed, the concentration of methane is 97–99%, earning the name biomethane. Once the gas is processed to biomethane, it

J22 TDLAS gas analyzer

Typical composition of biogas pre- and post-processing:

Chemical		Before processing	After processing
Methane	CH_4	50–80%	97–99%
Carbon dioxide	CO_2	20–50%	1–3%
Nitrogen	N_2	10–20%	0–2%
Oxygen	O_2	0–2%	<1000 ppmv
Hydrogen sulfide	H_2S	0–0.3%	<4 ppmv
Water	H_2O	0–90% (RH)	<10 0 ppmv

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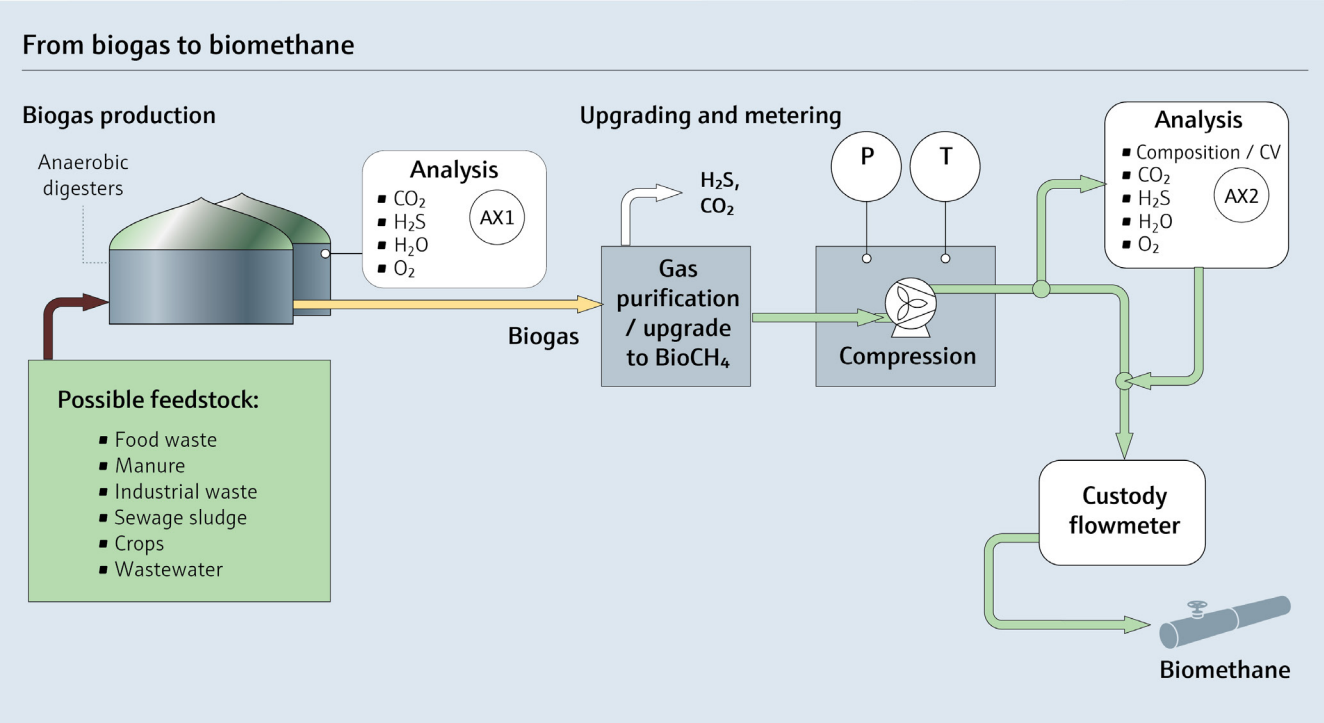
is injected into an interconnect pipeline where it is subjected to a custody transfer measurement. During this measurement, the biomethane must meet industry standards and local and regional regulations.

These standards specify the minimum levels of contaminants (H_2O, CO_2, H_2S and O_2) allowed in biogas to be injected and mixed into natural gas pipelines. Current industry standards for injection into the pipeline gas by utilities companies are aligned with the regulatory requirements for natural gas pipelines. If the biomethane meets industry standards, it is then transferred to a transmission pipeline for distribution.

The industry standards and governmental regulations are set to keep the public safe and sustain the integrity of the pipeline infrastructure. High levels of contaminants H_2O, CO_2, H_2S and O_2 cause corrosion in pipelines and can negatively affect combustion in generators.

Basic flow of biogas products

The process map shows a simple diagram that exemplifies a basic biogas system. The most common sources of methane are dairy farms and livestock, landfills, and wastewater.



Anaerobic digester: AX1

H_2O: SS500* J22 CO_2: SS2100a/i H_2S: SS2100 O_2: OXY5500

Post-gas processing: AX2

H_2O: J22 CO_2: SS2100a/i H_2S: SS2100 O_2: OXY5500

Multi-component*

SS2100 2-Pack (H_2S & H_2O or H_2S & CO_2)

SS2100 2-Pack + OXY5500 (H_2S, H_2O, O_2)

SS2100 3-Pack (H_2S, H_2O, CO_2)

SS2100 3-Pack + OXY5500 (H_2S, H_2O, CO_2, O_2)

*These products available with CSA Class I Div 2 certifications only.

Our Solution: Our analyzers employ tunable diode laser spectroscopy (TDLAS) that detects and measures the concentration of molecular compounds (H_2O, H_2S, CO_2) in gas streams. The rugged nature of our laser-based analyzers has allowed them to be used in natural gas pipelines with very little maintenance, no interference, and with no detrimental effects from glycol, methanol, amine, H_2S and moisture. Since its inception, this technology has demonstrated its reliability in thousands of installations worldwide.

Our TDLAS-based analyzers require no calibration in the field and the calibration is stable for the life of the analyzer; however, validation of H_2O, H_2S, and CO_2 concentration is simple to perform.

For performance specifications, please click the links below:

- Moisture in natural gas
- CO_2 in natural gas
- H_2S in natural gas
- O_2 in natural gas

SS500 TDLAS H_2O analyzer

J22 TDLAS gas analyzer

SS2100 TDLAS gas analyzers

OXY5500 optical oxygen analyzer

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