

Making biogas production valuable Forward to the future



“After discussing with the Plant Manager of the Miura Biomass Center, I decided to install the Vaisala MGP261. We now have access to a large amount of accurate data, which was not available before.”

- Mr. Sato, JFE Environment Technology Company Limited Environmental Solution Business Headquarters Engineering Department

“Previously we used a portable measurement solution to acquire and manage biweekly data, but with the installation of MGP261, we can monitor 24 hours a day. Having access to all that accurate data, immediately and at all times is a big leap and a massive advantage for us.”

- Mr. Sato, JFE Environment Technology Company Limited Environmental Solution Business Headquarters Engineering Department

The key players

JFE Environment Technology Company Limited is a one-stop environmental business solution provider. Focusing on the fields of organic waste treatment and biogas technologies, JFE Environment Technology Company Limited scope covers the full field from design, construction, engineering, and operation of biogas plants to plant equipment

maintenance.

Among JFE Environment Technology Company Limited’s environmental business, biogas stands out. A brilliant example is the Miura Biomass Center, a major contributor to creating a profitable waste treatment system for the local community.

The Miura plant treats and processes biowaste, such as

harvest leftovers from local farms and uses them as feedstock for biogas production. The process byproducts are returned to the farms as fertilizer — closing the loop and creating a circular economy. JFE Environment Technology Company Limited chose the Vaisala MGP261 multigas instrument for the Miura plant to monitor the quality of raw biogas and to help optimize biogas production.

Making biogas production valuable

To drive large-scale adoption of biogas as an energy source, its cost must be brought closer to that of conventional energy. That cannot be achieved without improving the efficiency of biogas plants and optimizing their use of heating and electricity.



"I was looking for the right biogas instrument as a means of risk mitigation. Now, if we see the methane concentration change or other signs of process instabilities, we can use the data from the Vaisala MGP261 as a basis for making timely decisions and taking necessary actions. Based on our experience with the instrument, we recommend the MGP261 be installed in all biowaste treatment plants in the future."



- Mr. Sato, JFE Environment Technology Company Limited Environmental Solution Business Headquarters Engineering Department

"Airflow, pressure and gas concentration are the parameters we look at when the CHP engine is unlikely to ignite. The gas concentration was not constantly monitored before, thus we used to spend time diagnosing issue with limited data. Now with the MGP261, we are able to continuously monitor gas concentration levels. This offers us greater insight into investigating and understanding the causes of issues and faults, which lead us to faster recovery times."



*- Mr. Yamazaki
Miura Plant Manager
JFE Environment Technology Company Limited
Environmental Solution Business Headquarters*

To convert recovered energy into electricity a biogas plant needs to meet their methane production volume target and demonstrate how their process is optimized for continuous quality improvements.

The Miura Biomass Center uses agricultural residues as their main feedstock for biogas production. Seasonal fluctuations in the incoming feedstock and thus in the quality of biogas produced represent a challenge. Maximizing methane concentration in biogas is a question of finding the best mix of feedstock. If the amount and quality of the feedstock could be kept constant, predicting and meeting the volume and quality targets for biogas would be easy. But as this is neither feasible nor practical, efficient process control is a must.

Continuous in-line monitoring

Since the introduction of Vaisala MGP261 biogas instrument, JFE Environment Technology Company Limited has been inspired by

its installation method. The MGP261 is directly inserted into the gas line, enabling constant, 24/7 monitoring, whereas earlier, conventional sampling and measurement gave results only biweekly or monthly. Constant monitoring allows the plant to detect the slightest changes in biogas components in the anaerobic digestion, which helps them improve operational efficiency and quality. Continuous data is an enormous benefit in investigating the causes of issues and faults.

“Running the trial through summer and winter confirmed that the Vaisala MGP261 measurement results linearly follow the laboratory data. While the fluctuation of methane concentration caused by seasonal changes had been observed in sampling-based spot-checks, the Vaisala MGP261 picked these changes up precisely and continuously.”

“When feeding the crop residue into the digester, we can now guide the process with actual, real time data from the MGP261 rather than going just with empirical experience.”



- Mr. Akaike, JFE Environment Technology Company Limited Environmental Solution Business Headquarters Engineering Department.

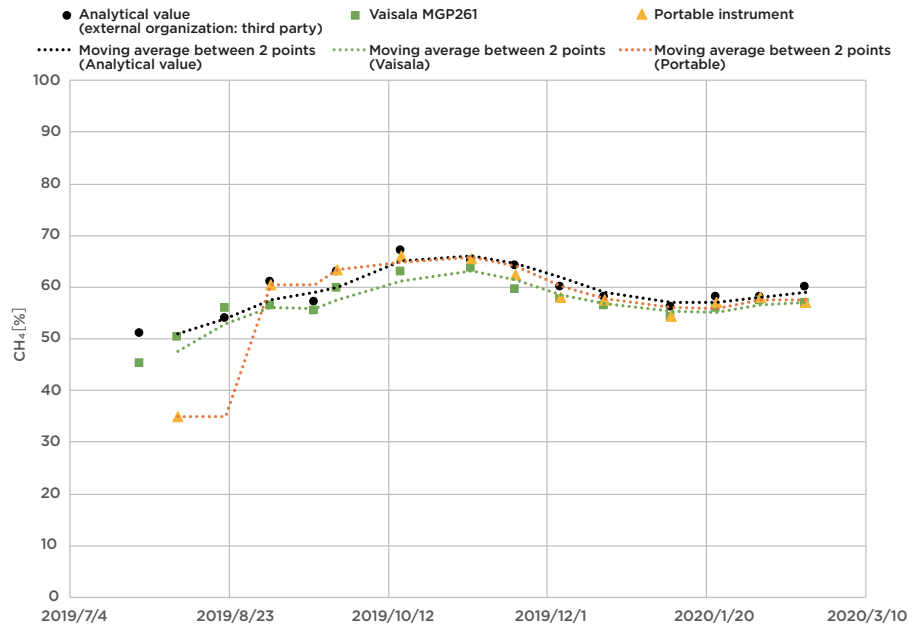


Chart1 Methane concentration ratios:

A match for the harshest environments

Hydrogen sulfide and water vapor in raw biogas cause corrosion, which can damage the pipeline and more crucially, the biogas engine. This can have a serious impact on operational efficiency.

Whereas conventional sensors cannot measure directly inside the process, the Vaisala MGP261 can — thanks to its built-in heating function that eliminates condensation from the sensor optics. Miura Biomass Center’s location on the coast of the Miura Peninsula puts a premium

on resistance to environmental factors, namely strong winds and salt damage from the sea — and the MGP261 matches both requirements with flying colors.



Confidence proven by test results

During the seven-month trial, MGP261’s continuous measurement data was compared against both bi-weekly measurement data provided by a 3rd party testing laboratory, and weekly measurement data from a sampling-based portable analyzer.

“We are highly interested in the latest technological developments, so when I heard that the Vaisala MGP261 can measure biogas directly from the gas pipeline, without sampling and desulfurization, I realized it would be very easy to install and would not take much space. What’s more, most devices and sensors that handle biogas usually have various restrictions on their conditions of use. To me the MGP261 is very disruptive as it can measure under the harshest of conditions.”

- Mr. Sato, JFE Environment Technology Company Limited Environmental Solution Business Headquarters Engineering Department

Smart operation

“The Vaisala MGP261 helps us run our gas boiler and CHP engine in a more controlled way. Since the instrument is installed directly in the gas line, we know immediately if methane concentration changes, and can take appropriate action to secure continuous energy generation.”

*- Mr. Yamazaki
Miura Plant Manager
JFE Environment Technology
Company Limited
Environmental Solution
Business Headquarters*



*- Mr. Ryose, Miura Regional Resources Use Co., Ltd.
Facility Manager*

“Our equipment and machinery run on electricity generated by the biogas plant. Digestate post-processing and heating the compost consume large amounts of electricity. When we can carefully monitor the methane concentration on a continuous basis and control the anaerobic digestion process more precisely, we can have more stable operations. Thus, it can lead to cost savings. The bill for backup energy needed to supplant seasonal fluctuations alone can amount to a high level, and we can now avoid that.”

Forward to the future

JFE Environment Technology Company Limited aims to provide consistent solutions for biowaste treatment and technologies for energy production that meet the needs of the local community.

Continuous development of technologies that improve biogas process efficiency, biogas quality and plant profitability are key enablers of growth for the biogas industry. Consequently, waste treatment facilities producing biogas and generating heat and

electricity for their communities will become more popular both in Japan and around the world. After the trial, the Vaisala MGP261 at Miura and elsewhere continues to contribute to this mission of sensing a sustainable future.





Vaisala MGP Series

- Ex certified to zones 0/1 enabling installation directly into the process line.
- The measurement utilizes Vaisala's patented CARBOCAP® infrared technology, which improves accuracy and minimizes calibration requirements compared to traditional analyzers.

	Vaisala MGP261 Methane, carbon dioxide and humidity multigas probe	Vaisala MGP262 Methane and carbon dioxide multigas probe
Primary use	Raw biogas monitoring	Biomethane offgas monitoring
Installation type	In-situ	
Sensor	CARBOCAP®	
Methane CH₄ measurement range	0 ... 100 vol-%	0 ... 5 vol-%
Carbon dioxide CO₂ measurement range	0 ... 100 vol-%	0 ... 100 vol-%
Water vapor H₂O measurement range	0 ... 25 vol-%, -10 ... +60 dew point °C (14 ... +140 dew point °F)	—
CH₄ accuracy at +25 °C (+77 °F) and 1013 mbar ¹⁾	0 ... 40 vol-%: ±2 vol-% 40 ... 70 vol-%: ±1 vol-% 70 ... 100 vol-%: ±2 vol-%	0 ... 5 vol-%: ±0.15 vol-%
CO₂ accuracy at +25 °C (+77 °F) and 1013 mbar ¹⁾	0 ... 30 vol-%: ±2 vol-% 30 ... 50 vol-%: ±1 vol-% 50 ... 100 vol-%: ±2 vol-%	90 ... 100 vol-%: ±1 vol-% 0 ... 90 vol-%: ±2 vol-%
H₂O accuracy at +25 °C (+77 °F) and 1013 mbar ¹⁾	0 ... 25 vol-%: ±0.5 vol-%	—
Repeatability CH₄	±0.5 vol-% at 60 vol-%	< ±0.1 vol-% at 1% CH ₄
Repeatability CO₂	±0.3 vol-% at 40 vol-%	±0.4 vol-% at 95 vol-%
Repeatability H₂O	±0.1 vol-% at 10 vol-%	—

1) Including non- linearity, calibration uncertainty, and repeatability; temperature and pressure compensated, excluding cross-interferences to other gases.

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