

On-site quantification of methane leaks from an agricultural biogas plant through three different methods

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Background & Objectives

Minimization of methane leaks in biogas facilities is a challenge in terms of GHG and loss of income. One of Trackyleaks' project main target is the methane leaks quantification on a bio-digester by using different methods. Two local and one global methods were involved: a proposed novel IR imaged based quantification approach, a bagging technique and a tracer gas test.

Materials & Methods

Two on-site campaigns were conducted at a small-scale agricultural biogas plant (150 kWe) located in Brittany (France). During these campaigns, three methods were tested. The boundary includes digester and pipes til engine.

Results & Discussion

The IR-camera was firstly used to pinpoint leaks. The bagging method focused deeply on two single leaks while IR camera and tracer gas methods assessed the whole leaks. For the tracer gas method, a known quantity of butane was introduced in the gasometer and its decrease was monitored. IR-camera is usually used as a detection method to pinpoint leaks location. In the present project, a novel flow estimator approach was developed to quantify methane leaks directly with the IR-camera. This quick method gives visual and instantaneous measurements. Another approach is the Bagging method used. This method was implemented in order to estimate temporal variability through a continuous monitoring system. This technology provides data along time, for each point measured and helps to know the range of these fugitive's emissions. Tracer gas method is a global method which measure the decrease of an inert gas injected inside the digester. The difference between the quantity injected and the quantity measured at the output gives the total loss during the process. This method needs measurement all along vapor phase renewal.

Conclusion

During the campaign measurement, consistency and complementarity were observed between the three methods. In order to assess fugitive emissions, three methane quantifying technics were applied on an agricultural biogas plant during two campaigns. These measurements allowed us to evaluate the loss of methane on the installation and to accurately compare the encouraging estimations provided by the three methods.

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