



CASE STUDY

Biogas plant improves carbon filter performance using H₂S data

Vesthimmerland Biogas sought an automated rather than manual H₂S monitoring setup to optimize filter performance and protect plant equipment. This was achieved using two SulfiLogger™ H₂S sensors installed before and after carbon filters in the upgraded biomethane stream. This approach enabled real-time tracking of filter performance, while also boosting the operator's confidence to perform other plant optimizations.

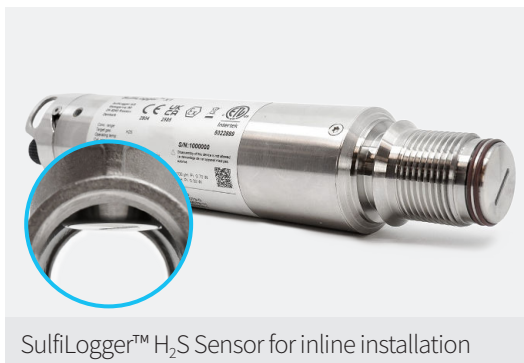
Background

Hydrogen sulfide (H₂S) poses a challenge in biogas affecting both equipment lifespan and process efficiency concerns. However, Biogas operators often struggle to get the H₂S insights that are needed to perform the necessary optimizations because the harsh nature of biogas operations are challenging to existing H₂S monitoring solutions. Real-time data on H₂S levels near critical desulfurization processes are essential for making the necessary adjustments and for understanding both peaks and trends in H₂S levels.

Challenge

Vesthimmerland Biogas, an upgrading biogas plant supplying renewable natural gas to the Danish natural gas network, encountered challenges caused by a reliance on manual H₂S grab sampling as a source for process control optimizations.

Operations Manager Flemming Nielsen highlighted the difficulty:



SulfiLogger™ H₂S Sensor for inline installation

“We used to do tube measurements if we felt something was suboptimal in the process, but it was too time-consuming and expensive to do many times in a day. With this approach, we couldn't capture the impact of changing the gas flow, temperature, and other parameters.”

This sporadic approach hampered performance optimization, necessitating an automated and continuous H₂S monitoring setup.

Industry

Biogas

Business needs

- ▶ Reliable H₂S measurements for process optimizations and improved equipment protection
- ▶ Less manual test handling

Solution

2 SulfiLogger™ H₂S sensors measuring continuously in the biomethane stream before and after the carbon filter setup

Benefits

- ▶ Automated monitoring system providing real-time H₂S data
- ▶ Performance monitoring of carbon filter setup for optimal filter cleaning and replacement
- ▶ No need for manual test handling

Solution

To optimize the H₂S monitoring setup, Vesthimmerland Biogas choose to install two SulfiLogger™ H₂S sensors. The sensors were installed on the upgraded biomethane stream, measuring H₂S levels immediately before and after an activated carbon filter setup. Installed inline, they continuously monitored in wet and anoxic conditions directly in the pipe, thereby eliminating the need for sample conditioning such as drying and filtering.

Integrated into the existing SCADA system via a 4-20 mA loop power connection, the sensors were calibrated by local operators every three months following the manufacturer's specifications for optimal accuracy. Prior to calibration, the sensors were cleaned with water.

Results

Following the installation of the SulfiLogger™ H₂S sensors, Vesthimmerland Biogas saw numerous benefits.

Real-time data facilitated timely adjustments, safeguarding critical process equipment from H₂S spikes.

Additionally, the sensors enabled precise monitoring of the performance of the carbon filter setup, ensuring filters were

cleaned in a timely manner and not changed prematurely. Flemming Nielsen emphasized this newfound confidence in process optimization:

"When filling a tank and displacing gas, we can track H₂S levels in real-time. It helps us identify changes, like stirring, and adjust gas mixtures to maintain steady H₂S levels through filters. We've also seen how long we can run the filter with the same agent. Without real-time H₂S data, these optimizations would be challenging."

Finally, by moving away from manual grab sampling to an automated monitoring setup with SulfiLogger™ H₂S sensors, Vesthimmerland Biogas freed up valuable time previously consumed by labor-intensive sampling processes. This allowed the plant operators to focus their energy on the important optimizations tasks.

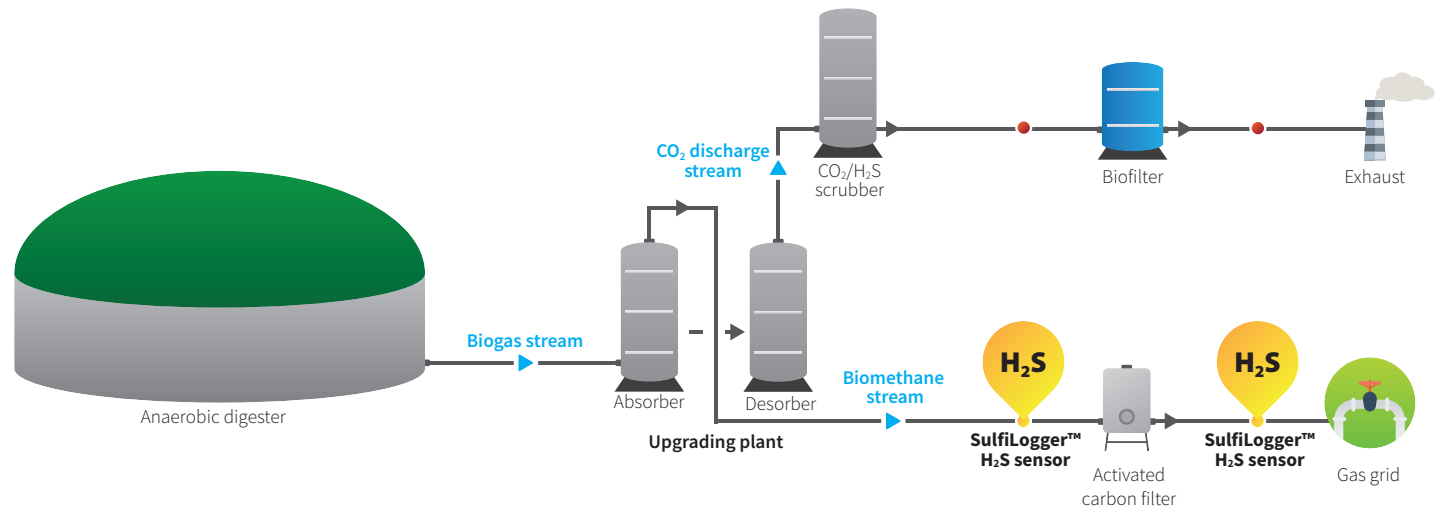


Vesthimmerland Biogas

Vesthimmerland Biogas supplies renewable natural gas to 18,000 households, handling 275,000 tons of biomass annually.

The plant is a biogas upgrading plant, where CO₂ is removed from the biogas and the upgraded biomethane is supplied to the nationwide Danish natural gas grid.

The plant uses a thermophilic process and uses various feedstock including manure, energy crops, and residual industrial products.



The two SulfiLogger™ H₂S sensors are installed directly in-pipe in the wet biogas and the upgraded biomethane stream before and after the activated carbon filter setup. Vesthimmerland Biogas has a total of 4 SulfiLogger™ H₂S sensors installed. The two other sensors - indicated by the red dots in the illustration - are used for monitoring H₂S emissions in the CO₂ discharge stream and prevent odor complaints and external odor tests. This application is explained in a separate case story by SulfiLogger.