The use of drones in CH4 emissions monitoring

Emissions of harmful gases play a major role in the current climate debate and environmental protection. Industrial plants have been known to be well-equipped with stationary gas detection systems, but some fugitive emissions, hard-to-reach pipelines and even ships at sea are challenging to monitor. In these cases, 'sniffer' drones can be of great benefit. The Danish company Explicit ApS is specializing in exactly this type of airborne environmental monitoring. Explicit ApS, together with the new LGD Compact module from Axetris, will have a significant impact on environmental monitoring.

Who is Explicit?

Founded in 1998, Explicit ApS has made it its mission to deliver better, more reliable and cost-efficient concepts and technologies for measuring emissions essential to our climate and air quality. Data specialists at heart, they have made it their priority to ensure the information they provide to their clients about emissions, is as reliable and actionable as possible. 100 % application-driven, Explicit selects and integrates technologies depending on emission scenarios working with innovations in sensors, airborne platforms, and measurement methodology to advance their data goals. Explicit measures both land-based sources and ship emissions at sea. The company holds several patents and has received international recognition for their solutions to monitor emissions.

Challenges for emissions monitoring by drones

Specializing in airborne monitoring, Explicit has built a substantial track record in emissions measurement using drones and helicopters. Explicit focuses in particular on drifting emissions that are inherently hard to measure and where monitoring offers the greatest value from an environmental and air quality perspective. Some of the target gases include CH4, CO2 and NH3. These gases can occur as fugitive emissions in many applications such as oil/gas, biogas production, landfills, wastewater treatment plants, farming and even at sea as CH4 escapes from LNG (liquefied natural gas) tanker ships. When measuring emissions with drones,

The LGD Compact integrated by Explicit ApS during first field test for monitoring CH4 emissions from biogas plants.

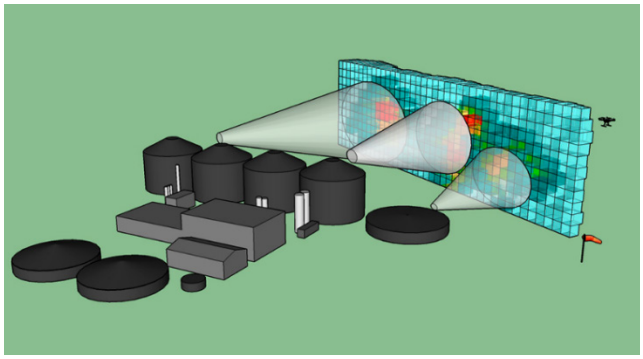
several challenges must be overcome. In addition to size and weight, sensor performance plays a decisive role. Concentrations are often small and conditions create a dynamic measurement environment where sensor reaction time, sub-ppm detection limits and general robustness becomes key.

"When measuring drifting emissions using drones, you face three key challenges: The sensor must be light enough to not hurt your flight endurance, it must be sturdy enough to not be affected by the movements of the drone, and it has to have a detection range that gives you accurate readings in low concentration scenarios. The LGD Compact for CH4 meets all of these criteria."

Jon Knudsen
CEO/CTO,
Explicit ApS

Bettina Knudsen
COO/CMO,
Explicit ApS

www.explicit.dk



Mapping of CH4 emissions measured at a biogas plant plant by using sniffer drones.

The LGD Compact in emissions monitoring

At a trade show, Jon Knudsen discovered the new LGD Compact from Axetris for CH4 detection. He was immediately impressed by its small size, which is perfectly suited for integration in small spaces and on drones. With an Axetris test unit, Explicit was able to quickly start the system integration and perform initial tests to quantify CH4 emissions from biogas production facilities and to measure methane slippage from LNG ship emissions.

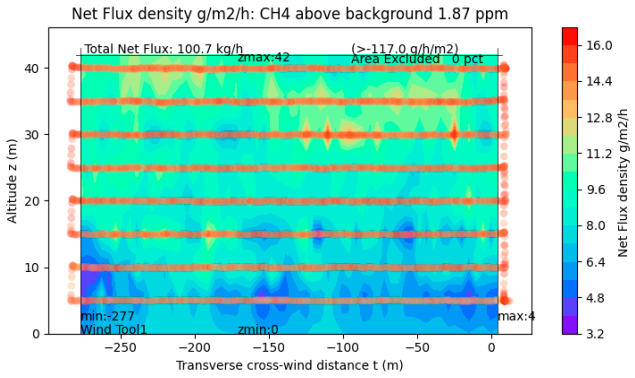
As part of its validation process, Explicit has also tested the LGD Compact under lab conditions against appropriate gas measurement technologies. The LGD Compact has demonstrated very convincing measurement performance in both the lab and field in terms of accuracy, detection limits down to sub ppm, linearity and reaction time.

About the LGD Compact

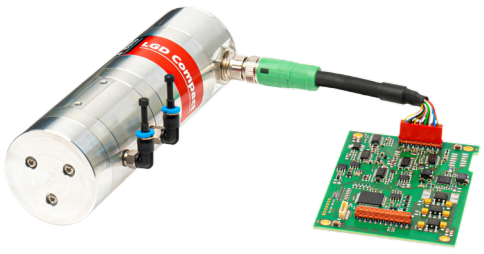
The new LGD Compact combines TDLS technology with a small and lightweight designed multipass cell and a modulation-based active noise reduction thanks to the unique optical laser package. Therefore, it is a perfect match for a wide range of portable instruments where performance and compact size matters.

What's next?

Explicit is already preparing for further applications with a wider range of gases with the LGD Compact. For the next product development, Axetris will focus on environmental gas detection of NH3 and CO2 for the LGD Compact platform. Both gases are part of the Explicit application pipeline as the company looks to expand the types of targeted emission sources and extend their portfolio in emission monitoring services.



When determining emission rates from a source, the drone maps out a vertical data grid of gas concentrations and wind vectors. Based on the data, Explicit is able to calculate how much total CH4 is being emitted (kg/h) to help quantify emissions and locate leak(s).



Switzerland

Axetris AG (Headquarters)
6056 Kaegiswil
phone +41 41 662 76 76
axetris@axetris.com
www.axetris.com

USA

Leister Technologies LLC
Itasca, IL 60143
Fremont, CA 94538
phone +1 844 293 8747
axetris.usa@axetris.com
www.axetris.com

China

Leister Technologies Ltd.
Shanghai
Shenzen
phone +86 21 6442 2398
axetris@axetris.cn
www.axetris.cn

Japan

Leister Technologies KK
Shin-Yokohama 222-0033
phone +81 45 477 36 37
axetris@axetris.jp
www.axetris.jp