A4I Analysis for Innovators

IMSPEX Diagnostics Ltd advances testing of biomethane as green energy source

Technology business IMSPEX Diagnostics Ltd partnered with NPL to bring new capability to how siloxanes in biomethane are detected and measured. The aim was to unlock major potential for its own business and drive forward European measurement standards.

Challenge

The UK is increasingly harnessing the potential of biogas produced naturally at wastewater treatment plants and landfill sites as a source of green energy.

Biomethane is produced by the anaerobic digestion of organic matter such as sewage, manure and plant material.

But within biomethane are siloxanes which, when found at higher levels, can cause damage to the power generation equipment being used to turn the gas into electricity.

Siloxanes are found within many personal care and industrial products such as shampoo and are silicone-based compounds that are generally used for their softening or moisturising action.

IMSPEX, which is based in Abercynon, Wales, looked to deploy its existing GC-IMS testing platform to analyse and measure the levels of siloxanes.

The project focused on detecting siloxanes at amount fraction in the low nmol mol^{-1} range.

IMSPEX's proprietary analytical instrument platform combines Gas Chromatography (GC) with Ion Mobility Spectrometry (IMS) to detect gaseous compounds in a mixture of analytes, in a highly sensitive and accurate way.

IMSPEX joined forces with NPL through an Analysis for Innovators (A4I) project to measure siloxanes at trace concentrations and ensure robust validation of these results.

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Innovate UK

Through the scheme, IMSPEX aimed to build confidence in the accuracy of its GC-IMS Silox device, which has been developed to be used onsite at landfill and wastewater plants.

The project also provided IMSPEX with an additional opportunity of increasing the credibility of their technology with respect to industry ISO standards, which are driven by the industry's current measurement capability.

> *"If the technology becomes an ISO standard for siloxane measurements, this is a game-changer for IMSPEX. Monitoring siloxanes to a known standard will drive the industry forward and we will see our technology rapidly integrate into biomethane plants across Europe."*

Dr Emma Brodrick
Project Lead and Systems Application Manager, IMSPEX Diagnostics Ltd.

Solution

Through the A4I project, NPL validated the measurements produced by the GC-IMS Silox device to a recognised industry standard using certified traceability, ensuring confidence in its accuracy.

NPL created an analytical methodology and determined the limit of detection (LOD) and traceability in a controlled laboratory environment.

Impact

The project has given IMSPEX a competitive edge in being able to produce a validated LOD below its nearest competitor. The business estimates this may unlock initial potential revenues of £43 million, and £5 million annually thereafter.

To further develop high-accuracy reference methods for siloxanes in biomethane there was a clear need for the development of a standardised test method.

After using IMSPEX's technology in the A4I programme, NPL identified the potential of the GC-IMS as a suitable technique for performing quantitative analysis.

NPL incorporated this method development into a collaborative European project and the GC-IMS siloxanes method has now been proposed as an ISO standardised test method.

The A4I project also moved IMSPEX significantly closer to understanding the onsite requirements for the successful deployment of its Silox device.

It showed that the cost of the Silox device is relatively small in comparison to the installation, safety and compliance, and staff training costs.

As such, IMSPEX now anticipates entering the market with an OEM and is in the process of identifying future partners.

A4I

A4I is a programme that gives UK businesses, of any size, access to cutting-edge R&D expertise and facilities to help solve problems that they have been unable to tackle using standard techniques. The focus is on solving issues affecting product cost, reliability or lifetime and production problems.

NPL ktn TÜV SÜD National Engineering Laboratory NML UKRI Science and Technology Facilities Council

> *"Green energy is a subject that is close to the top of many people's list of priorities as the climate change crisis accelerates. IMSPEX Diagnostics is pleased to be able to add to the efficiency and effectiveness of renewable power generation from biogas by streamlining siloxane measurement."*

Santi Dominguez
CEO of IMSPEX Diagnostics Ltd.

IMSPEX DIAGNOSTICS LIMITED

For more information on how A4I can help you visit A4I.info